CAUTION

READ THIS MANUAL CAREFULLY TO DIAGNOSE TROUBLE CORRECTLY BEFORE OFFERING SERVICE .

Refrigerator

SERVICE MANUAL

MODEL: HB21FWRSS

Features:

1.Chill drawer for delicatessen
2.Slide-out shelf for easy food access
3.Optimized condensing system
4.Pre-cooling for defrosting for freshness storage
5.Automatic problem detecting and warning system, door cooling warning system
6.Vitamin C technology for fresh food storage
7.Ice making
8.Intelligent operation for automatic operation
9.Dispenser for cold drinks

Haier Group

EDITION:2008-03-24

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SAFTY RECAUTIONS

a、Power supply: 220V/50HZ

This refrigerator use Alternating Current of 220V/50Hz.If the range of the voltage fluctuates too significantly, it is possibly will make the refrigerator not start, and will burn down the master board and the compressor, or will make the sound of the compressor be out of the way. When this does happen, an automatic manostat must be installed.

b、The appliance must be plugged into a dedicated outlet that is securely grounded.

An independent special electrical outlet must be used and reliable earthing must be done on the electrical outlet. This refrigerator is equipped with three electrical source lines (earthing lines) and the connector plugs are in accordance with the normal three-lined earthing electrical outlet.

WARNING! The plug should be securely connected to the socket or otherwise fire hazard may arise.

c、Be careful not to damage the power cord.

1. Don't let the refrigerator body press the power line or let the man-caused stamping of the power line happen.
2. When moving the refrigerator from the wall, please be careful not to press or roll or damage the power line.
3.Don't pull out the connector plugs of the refrigerator in the way of pulling out the power line.

d、When the power cord is damaged

When the power line is damaged or frayed, you must go to the servicing station specified by the manufacturer to ask for a new one.

e、When there is a gas leakage

1. Shut off the gas valve.
2. Open the doors and windows for ventilation.
3. Do not plug or unplug the refrigerator or other electric appliances.

f、Always remember to unplug the appliance in the following cases:

1. Unplug the appliance before cleaning and reparation.
2. Unplug the appliance before replacing the old light bulb to prevent electric shock.

g、Never store inflammable or explosive items and strong corrosive acids or alkalis in the appliance.

h、This appliance is a household refrigerator, which is produced in accordance with the specification of national standard. It is intended for food storage only, not for storage of blood, medicine and biological products.

i、To prevent risk of fire, keep the appliance away from gasoline or any other inflammables.

SAFTY RECAUTIONS

j、To prevent risk of electromagnetic interference or other accidents, do not place any patch panel, voltage stabilizer and microwave oven on top of the refrigerator or use any electric appliance (unless recommended by the manufacturer) inside the refrigerator.

k、Children are not allowed to play with the door or the bottle racks. Serious injury may occur.

l、The internal surface of freezer compartment is very cold when the appliance is running. Do not touch the surface especially when hands are wet.

m、The gap between the doors and the gap between the doors and the cabinet are very small. Make sure figures do not get stuck. Always keep children away when a door is opened or closed.

n、Do not splash water onto the refrigerator. Keep off places of high humidity that may have adverse effect on the electric insulation performance.

o、No dismantlement or modification can be made without authorization. Damage to refrigeration system is strictly prohibited. Reparation must be carried out by authorized personnel.

p、Bottled beer or beverage should not be stored in the freezer compartment - risk of explosion.

q、Unplug the appliance in the event of power interruption or cleaning. The appliance can be plugged again only after an interval of at least 5 minutes to prevent damage to the compressor caused by frequent startups.

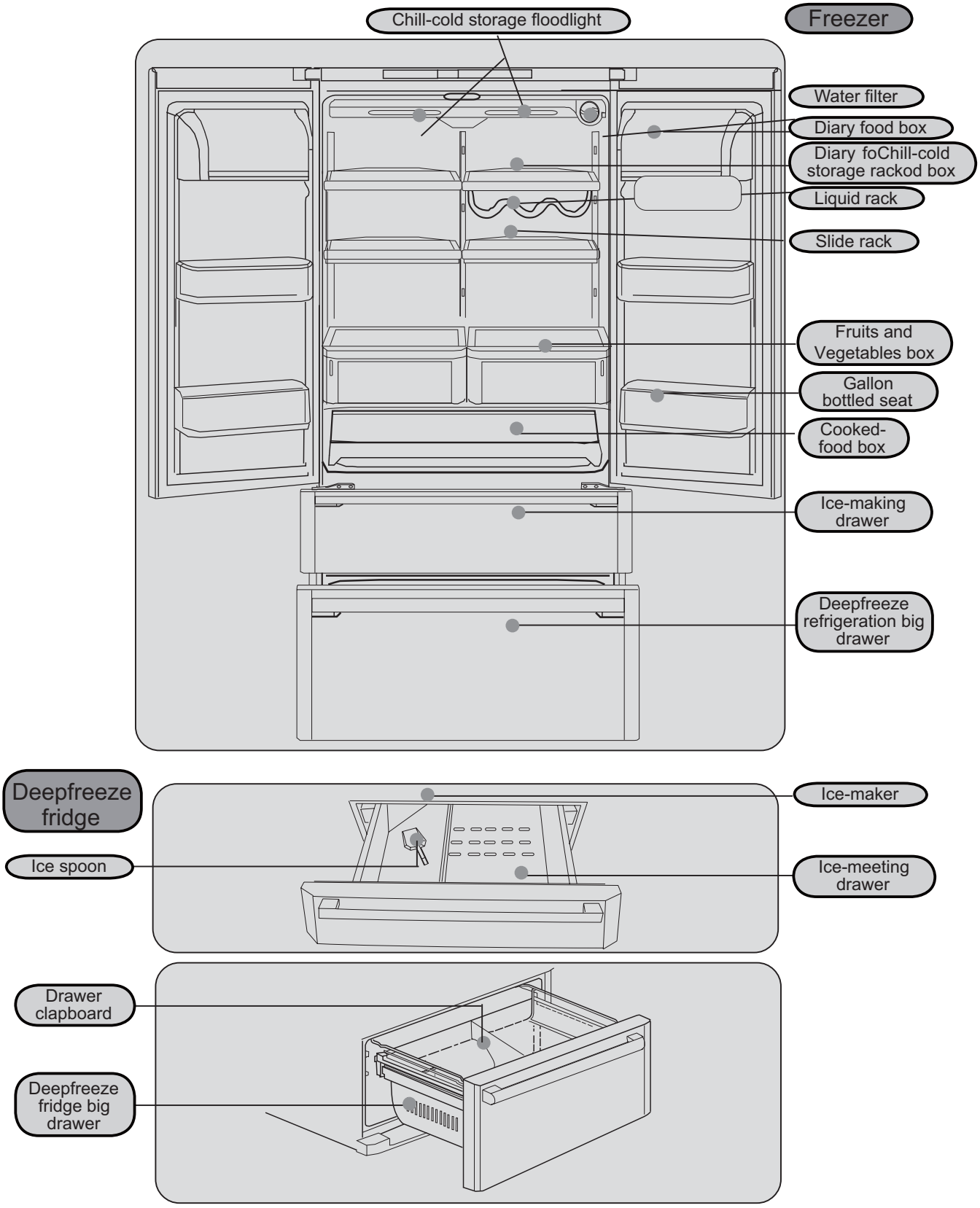
r、Please remove the door, door seal and shelves before disposal of the old appliance and put them away in a safe place to prevent children from being entrapped.

SPECIFICATIONS

	Refrigerator		
1.	**Model**		HB21FW**RSS**
	Photo		
	Commercial brand		**Haier**
	Product description		**REFRIGERATOR-FREEZER**
	Type of Appliance (FS= freestanding BI= built-in)		FS
	Energy efficiency class		**A**
	Climate class (N= + 18-32 °C T=+ 18-43 °C)		SN/N
	Freezer compartment / Star rating		****
2.	**Key features**		
	Gross capacity	L	586
	Total net capacity	L	557
	Defrosting (**H**=manual **A**=automatic) ***Fridge/Freez***		A
	Defrost water outlet		Ye s
	Air circulating ventilator		Yes
	Kind of coolant *(R134a/R600a)*		R600a
	Foaming components		HFC-245fa
3.	**Technical data**		
	Voltage / frequency	V/Hz	220-240 V~/ 50Hz
	Input power	W	120
	Length of cable / *incl. plug*	cm	350
	Temperature range (from>to) ***Fridge / Freez***	°C	-21~-7
4.	**Aesthetics**		
	Colours (see **L**):		
	Top cover		Black
	Cabinet		B l a c k
	Door		Black
	Door Frame		Black
	Fascia panel / Handle		Black
	Inside door/-drawers (w=white t=transpar.)		- / -
	Door:		
	F= Flat / R= Rounded / S= Streamline		S
	Hinged *(r =right l =left) / reversible)*		-both side -
	Lock		- no -
	Shelves:		

	Number			4
	Type	(gr=grill/g=glass/p=plastic)		g
	Colour of shelves			
	Adjustable			YES
	Drawers:			
	Number		n°.	2
	Crisper:			2
	Salad crisper(s)	*transparent / white*		transparent
5.	**Equipment & Accessories**			
	Control Panel:			
	Control panel	*interior / exterior*		Exterior
	Thermometer	*interior / exterior*		Ex terior
	Control lamps	*green / yellow / red*		
	Over temperature ALARM	*LED / acoustic*		acoustic
	Adjustable thermostat			NO
	Fast freeze switch			YES
	Interior light		W	25
	Adjustable feet	*front / rear*	n°	*fron t*
	Castors	*front / rear*		rear
6.	**Product dimensions**			
	Unit dimensions	***H / W / D***	mm	1771*908*759
	Depth with open door		mm	
	Net weight		kg	145
7.	**Packing dimensions & loadability**			
	Packing dimensions	***H / W / D***	mm	1 1960*974*863
	Gross weight		kg	160
8.	**Recycling symbols**			
	Carton	*weight in g*	kg	
9.	**Service**			
	Users instruction	*(languages)*		English
10.	**Others**			

PARTS IDENTIFICATIONS



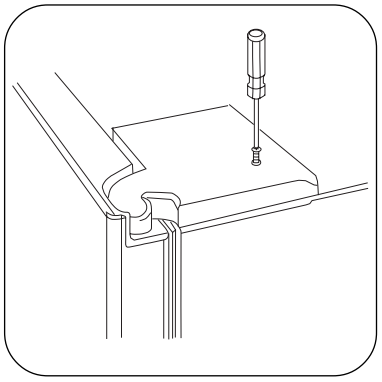
Note

For the application of this brochure to different models, the characteristics of the refrigerator you are using may be different from the descriptions in this brochure.

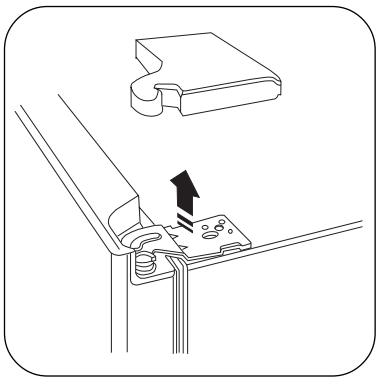
DISASSEMBLY

1. Removing and replacing the right door of refrigerator compartment

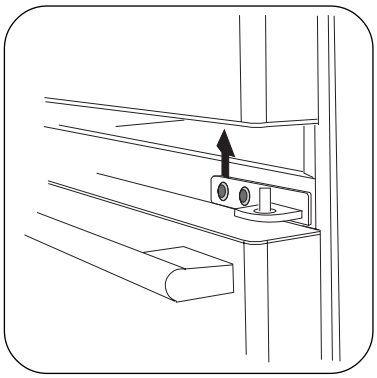
①Unscrew the upper right hinge cover by means of screwdriver and then remove the hinge cover.



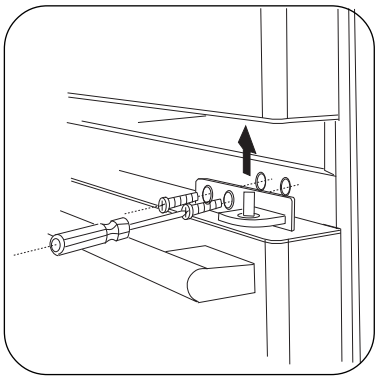
② Unscrew the upper right hinge by means of hexagonal screwdriver and then remove the hinge.



③Remove the door and place it in a proper position.

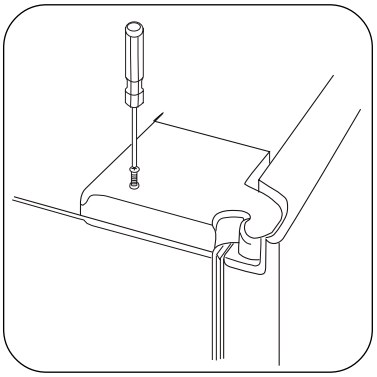


④ Remove the middle hinge if necessary.

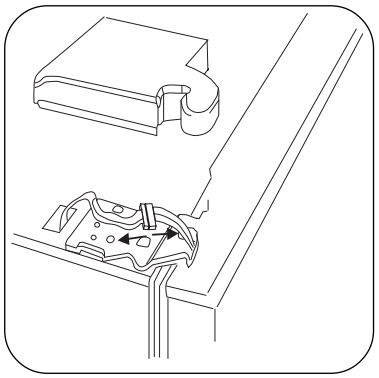


2. Removing and replacing the left door of refrigerator compartment

①Unscrew the upper left hinge cover by means of screwdriver and then remove the hinge cover.



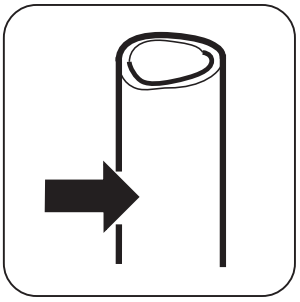
②Unscrew the upper left hinge by means of hexagonal screwdriver and then remove the hinge.



DISASSEMBLY

3. Pipes connecting

Install the stopping valve on the drinking pipe that is frequently used recently.

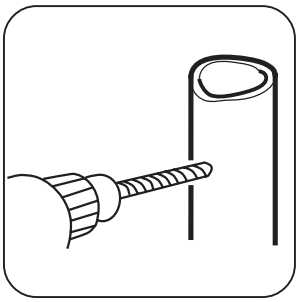


1. Turn off the main water supplying pipe routine

Turn on the nearest tap till the water pipe is cleaned completely.

2. Choose the position of the valve.

Choose a position for the valve that is easy to be approached. It is recommended that the valve is connected to the side of a vertical water pipe, and if it is really needed to connect the valve to a level water pipe, connect it to the upside of the water pipe not the downside, in case the sediment may flow out from the water pipe.

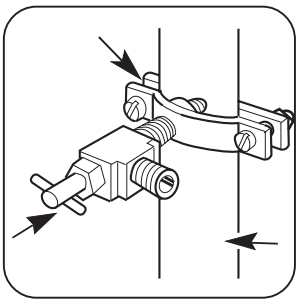


3. The hole of the drill valve

Drill a hole of 1/4 inches on the water pipe using a sharp drill (even using an automatic valve). Clean the burr left on the water pipe by the drill.
Not let the water flow into the drill.

4.Tighten the stopping valve.

Tighten the stopping valve on the cold water pipe using a pipe nip. Follow the rules specified in the 248CMR of Massachusetts Federal Piping Standard. Saddle-backed is unlawful in Massachusetts and is forbidden. Please consult the plumber's mate with working license.



5. Tighten the pipe tip.

Tighten the bolts of the pipe tip till the closing circle begins to expand.

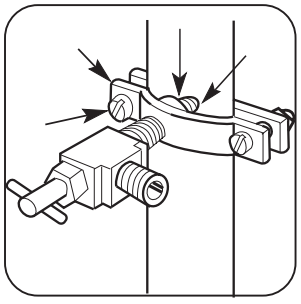
Don’t let the bolts of the pipe tip be too tight, otherwise the water pipe is pressed flat.

6. The deposing line of the pipe

The deposing line between the cold water pipe and the refrigerator

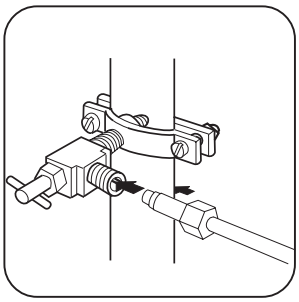
Drill a hole on the wall or on the floor that is near the wall to a great degree, and let the pipe line go through the hole.

Assure the pipe has an enough margin area(about 8 inches [2.4 meters] and make it be three circles with the diameter of each circle about 10inches[25 centimeters], and after this installment is done, the refrigerator can be moved away from the wall.



Pipes connecting

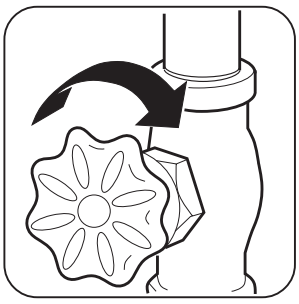
7. Connect the pipe to the valve



Put the Tightened nuts and the copper shaft on the end side of the pipe and connect the pipe to the stopping valve. Make sure that the pipe is cut into the valve completely. Tighten and press the nut.

Follow the descriptions specified in 248CMR of Massachusetts Federal Piping Standard. Saddle-backed is unlawful in Massachusetts and is forbidden. Please consult the plumber's mate with working license.

8. Clean the Pipe

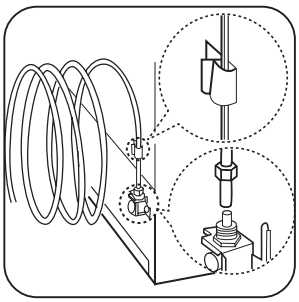


Power the main water supply till the water in the pipe becomes clean. Turn off the water valve after having used water of about 1v.

9. Connect the pipe to the refrigerator.

Note

Before connecting the pipe to the refrigerator, make sure that the power line is not cut into the electric plug on the wall.

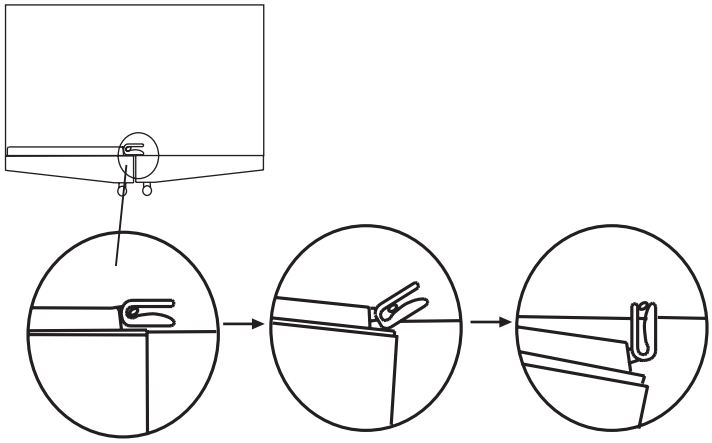


(1) Tighten the water pipe on the water valve and take the nut off the water pipe.

(2) And then, as shown in the figure, connect the end side of the water pipe to the water valve; tighten the water pipe using tightening nuts.

4. Operation of the Chill-cold storage Vertical Girder

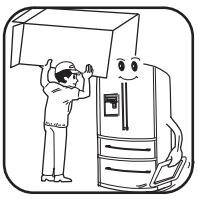
The chill-cold storage vertical girder goes around the vertical girder orientation shaft when the chill-cold storage left door body is opened. After the chill-cold storage left door body is opened, don't circle the chill-cold storage vertical girder with your hands, in case the door may not be closed.



DISASSEMBLY

5. Dismantle all subassemblies

The foam base seat as well as the adhesive ape as a fixed additional part must bealso dismantled.

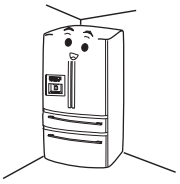


6. Check all the additional parts and materials with the machine.

The articles in the box must be checked according to the descriptions on the incasement list, and if there is any difference between the description on the incasement list and the actual case, please consult the seller shop for information.

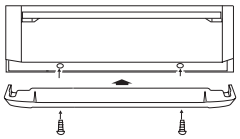
7. Place the refrigerator at a proper position

See the previous ¡°Position Environment¡±



8.The installment of the decorating articles at the base.

Open the door of the refrigerant room and from the refrigerant room take out the decorating articles and install them at the proper positions, and drill the bolts



Note

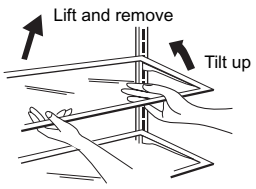
For the convenience of searching information, the number of the refrigerator and the number of manufacturing should be copied on the guarantee issue.

9. Height-adjustable Shelf

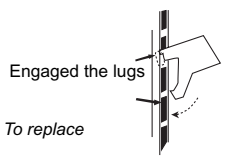
The height of shelf can be adjusted to meet your storage needs.

To adjust the shelf height, remove the shelf first. The steps are as follows:

tilt the shelf up at front, and lift it up and out of tracks. To replace the shelf, with shelf front raised slightly, engage the lugs in tracks. Then lower shelf front until it locks into position.



To remove

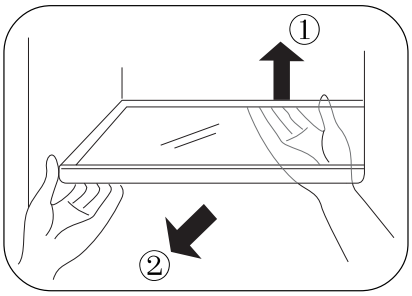


To replace

DISASSEMBLY

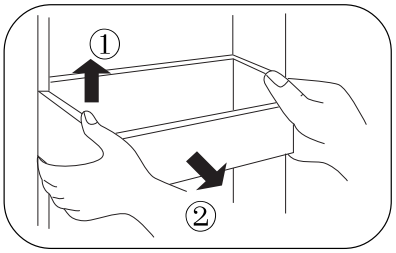
10. Removing Crisper Cover

Take out the crisper and put it away. Lift up the cover end (1) and remove it (2).



11. Cleaning door bin

Lift the bin up (1) and pull it towards you (2). Replace the bin in the reverse sequence of removal after cleaning.



12. The Installment of the Cover in Front of the Cooked-food Box.

Take out the front cover of the cooked-food box, put the circling shaft on both sides of the front cover of the cooked-food box into the supporting blocking tank of the cooked-food box, and circle down the front cover of the cooked-food box. Note: the angle between the front cover of the cooked-food box and the slide-way support must be about 90 degrees.

13. It is recommended that before being used the refrigerator should be cleaned first.

Before putting food into the refrigerator, please clean the inside and outside of the refrigerator completely using the baking soda diluted by water (by the ratio of 4L water to a spoon of baking soda).

DISASSEMBLY

14. Place the refrigerator without turning on the power.

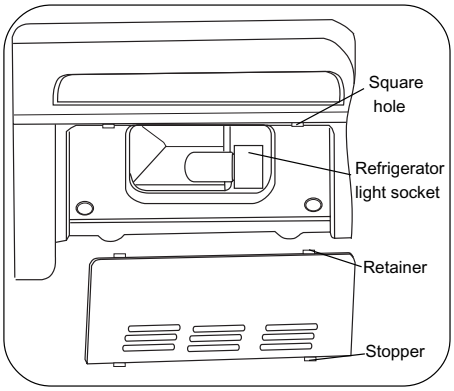
After the refrigerator is placed at a flat position and cleaned, don¡¯t turn on the power immediately, rather you should place the refrigerator for about 6 hours without turning on the power. After at least 6 hours, turn on the power so that the refrigerator can operate well.

15. Replacing the Light Bulb(refrigerator)

Bulb specifications: 220V~, 25W

Socket: E14 (DO NOT use a bulb over 25W)

- Unplug the appliance.
- ①To remove the light shield, press the stopper at rear out of the square hole.
  ② Pull the shield backward until the retainer is separated from the square hole.
- Turn the bulb anticlockwise and out. Replace a bulb of the same specifications in the reverse sequence of removal.
- To replace the light shield: Engaged the retainer into the square hole and then press the shield rear forward until the stopper is locked in the square hole.



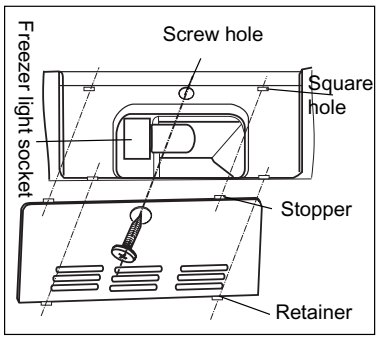
Light bulb

DISASSEMBLY

16. Replacing the Light Bulb

Bulb specifications: 220V~, 25W
Socket: E14 (DO NOT use a bulb over 25W)
To replace the light bulb:

1. Unplug the appliance.
   ①Remove the front screw with a screwdriver.
   ②To remove the light shield, press the stopper at front out of the square hole.
   ③Pull the shield forward until the retainer is separated from the square hole.
2. Turn the bulb anticlockwise and out. Replace a bulb of the same specifications in the reverse sequence of removal.
3. To replace the light shield: Engaged the retainer into the square hole and then press the shield front backward until the stopper is locked in the square hole. Replace and tighten the screw.



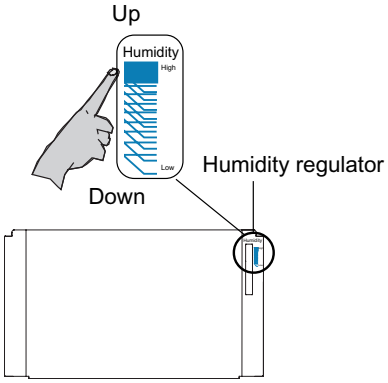
Freezer light bulb

17. How to User the Crisper

The appliance is equipped with a crisper for vegetable and fruit storage. You can set the humidity to meet your storage needs.

1. Turn the humidity regulator (located at the upper right corner of the crisper) up to get a higher humidity suitable for storage of cucumber, grape, kiwifruit and persimmon etc.

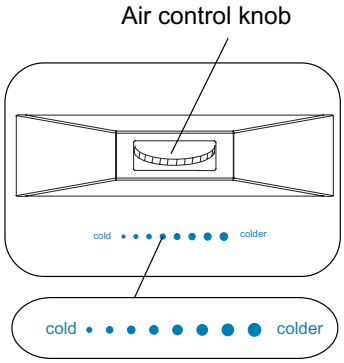
2. Turn the humidity regulator (located at the upper right corner of the crisper) down to get a lower humidity suitable for storage of strawberry, orange, bean, garlic, watermelon, plum and tomato etc.



18. How to Use the Delicatessen Drawer

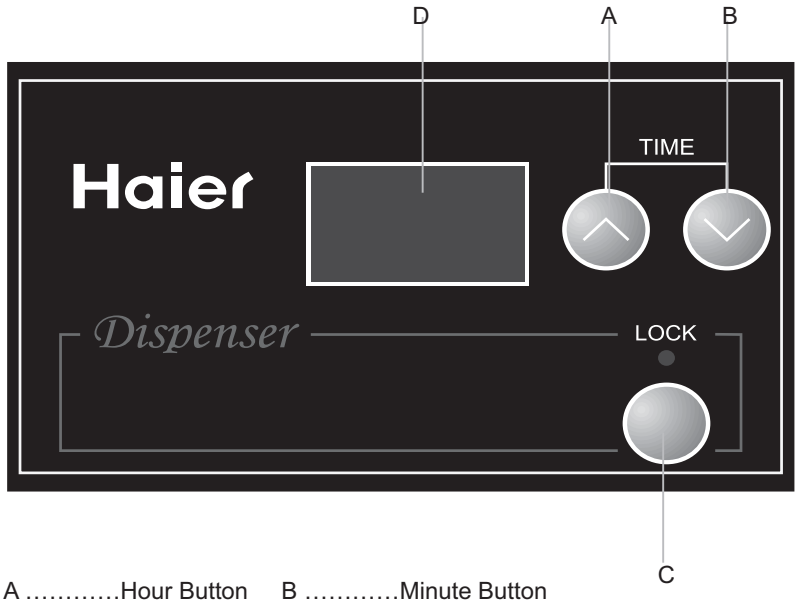
The appliance is equipped with a delicatessen drawer with a temperature range from -2℃~+3℃. The temperature can be adjusted by the air control knob to meet your storage needs.

1. Turn the air control knob leftwards (weak) to reduce the cooled air moving in the delicatessen drawer and maintain a higher temperature;
2. Turn the air control knob rightwards (strong) to increase the cooled air moving in the delicatessen drawer and maintain a lower temperature.



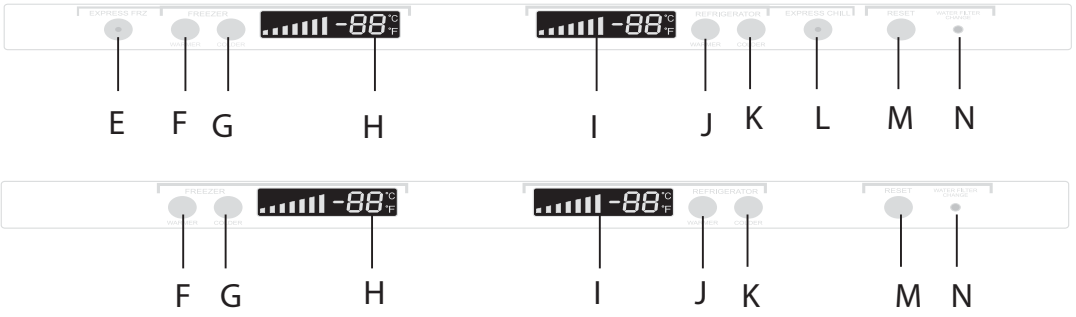
CONTROL AND DISPLAY SYSTEM

The door body vision controlling screen



A ……Hour Button B ……Minute Button
C…… Lock Button D……Time Area

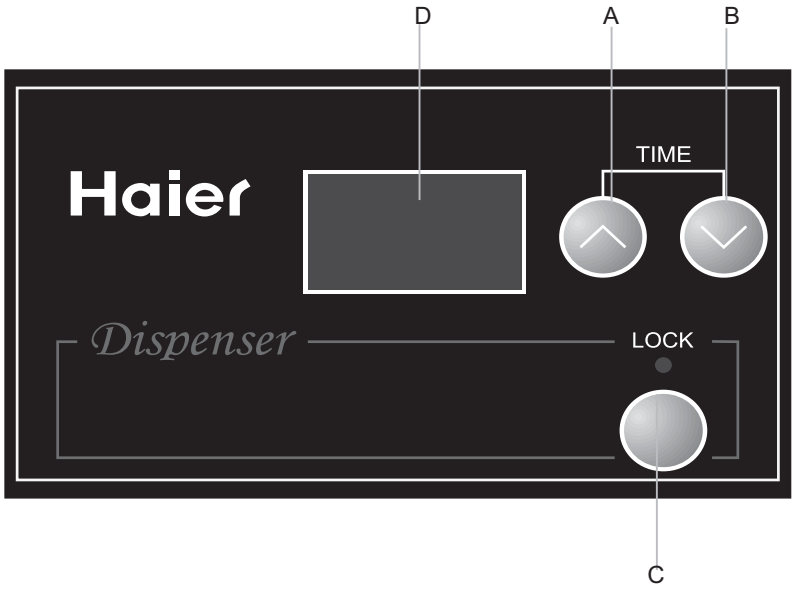
Function adjustment and control principle



E ……Quick-refrigerant button
H ……deepfreeze fridge temperature indicating area
J.K…...…chill-cold storage temperature adjusting button
M……..……Water filter reset button
F, G……Deepfreeze fridge temperature adjusting button
I……..……Chill-cold storage temperature indicating area
L……..……Chill-cold storage quick-deepfreeze fridge
N……..……Water filter indicating lamp

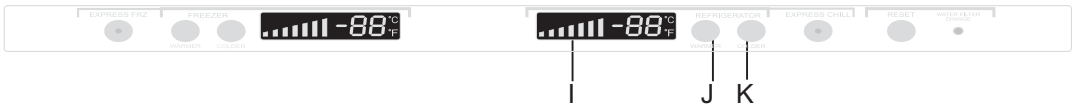
CONTROL AND DISPLAY SYSTEM

1. Lock and Unlock

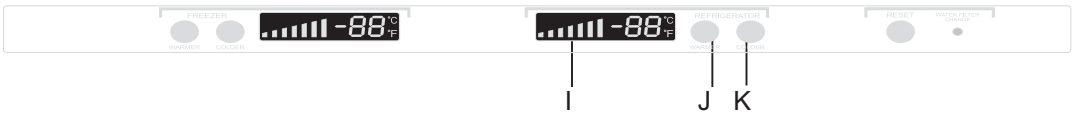


Press Button C, after the first sound of the buzzer, fix the indicating lamp to be lighted, and the clock setting of the door body vision cannot be operated, and the function of taking out cold drinks is locked; press Button C again, after the first sound of the buzzer, fix the indicating lamp to be out, and the clock setting of the door body vision operation is recovered.

2. Chill-cold storage temperature adjustment



(Only apply for the models with the function of taking out cold drinks)



(Only apply for the models without the function of taking out cold drinks)

Press Button J or Button K, the chill-cold storage temperature vision area will flicker, and when the chill-cold storage temperature is set, the range of the chill-cold storage temperature is 34 degrees to 46 degrees, and each time you press Button K, the chill-cold storage temperature will increase a level, till the highest Level Seven is reached; each time you press Button J, the chill-cold storage temperature will decrease a level, till the lowest Level One is reached.

CONTROL AND DISPLAY SYSTEM

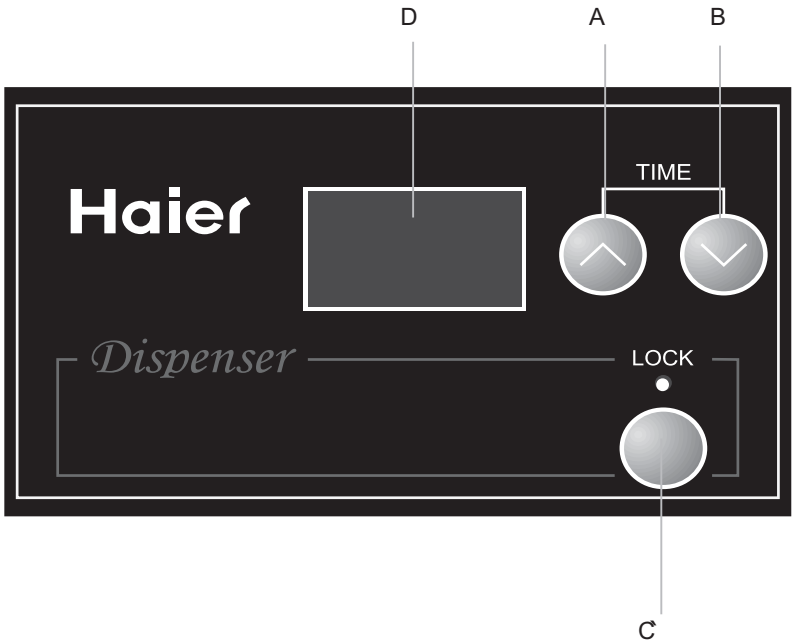
3. Deepfreeze fridge temperature adjustment

(Only apply for the models with the function of taking out cold drinks)

(Only apply for the models without the function of taking out cold drinks)

Press Button G or Button H, the deepfreeze fridge temperature vision area H will flicker, and when the deepfreeze fridge temperature is set, the range of the deepfreeze fridge temperature is -7 degrees to 8 degrees, and each time you press Button G, the deepfreeze fridge temperature will increase a level, till the highest Level Seven is reached; each time you press Button F, the deepfreeze fridge temperature will decrease a level, till the lowest Level One is reached.

4. Door body vision time adjustment



When pressing Button A and Button B at the same time for three seconds, the time sign D will begin to flicker after the first sound of the buzzer. Press Button A to adjust the hours, each time you press Button A, one hour will be increased, till 23 hours is reached, then press Button A again, 00 will be shown. Press Button B to adjust the minutes, each time you press Button B , one minute will be increased, till 23 minutes is reached, then press Button B again, 00 will be shown.

CONTROL AND DISPLAY SYSTEM

5. Refrigerant quick-deepfreeze refrigeration setting

The function of quick-deepfreeze refrigeration is to refrigerate the food completely in the shortest time.Press Button E, the refrigerant quick-deepfreeze refrigeration button indicating lamp will be lighted, and the refrigerator will be in the refrigerant quick-deepfreeze refrigeration state, and the refrigerator will be out of the refrigerant quick-deepfreeze refrigeration state after it enters the refrigerant quick-deepfreeze refrigeration state for 4 hours; if you want the refrigerator to be out of the refrigerant quick-deepfreeze refrigeration state forcefully after it enters the refrigerant quick-deepfreeze refrigeration state for three hours, you can press Button E again, and the refrigerant quick-deepfreeze refrigeration button indicating lamp will be out, and the refrigerator will be out of the refrigerant quick-deepfreeze refrigeration state.

6. Chill-cold storage quick-deepfreeze refrigeration setting

Press Button L, the chill-cold storage quick-deepfreeze refrigeration button indicating lamp will be lighted, and the refrigerator will be in the chill-cold storage chill-cold storage quick -deepfreeze refrigeration state, and the refrigerator will be out of the chill-cold storage quick -deepfreeze refrigeration state if the chill-cold storage temperature is 2 F lower than its designed temperature; if you want the refrigerator to be out of the chill-cold storage quick -deepfreeze refrigeration state, you can press Button L, and the chill-cold storage quick -deepfreeze refrigeration button indicating lamp will be out, and the refrigerator will be out of the chill-cold storage quick -deepfreeze refrigeration state.

Note

When the refrigerator is in the refrigerant quick-deepfreeze refrigeration state and in the chill-cold storage quick -deepfreeze refrigeration state, within the set time, the process of refrigerating remain constant without turning off the machine.

CONTROL AND DISPLAY SYSTEM

7. Turn on or turn off the chill-cold storage function

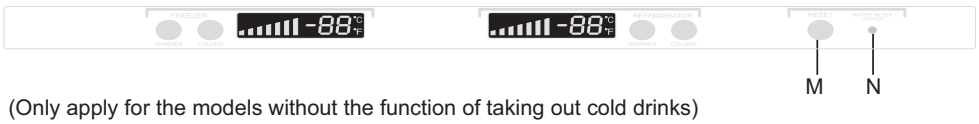
When pressing chill-cold storage adjustment Button J and chill-cold storage adjustment Button K at the same time for three seconds, the chill-cold storage sign I will be out after the first sound of the buzzer an the chill-cold storage function is turn off; when pressing chill-cold storage adjustment Button J and chill-cold storage adjustment Button K at the same time for three seconds again, the chill-cold storage sign I will be on after the first sound of the buzzer and the chill-cold storage function is turn on again.

8. Celsius / Fahrenheit switching function

Press Button F and Button G and Button J on the vision board at the same time for three seconds, the Celsius will be used after the first sound of the buzzer; Press Button F and Button G and Button J on the vision board at the same time for three seconds again, the Fahrenheit will be used after the first sound of the buzzer.

9. The indicated meaning of the water filter

(Only apply for the models with the function of taking out cold drinks)



(Only apply for the models without the function of taking out cold drinks)

When the indicating light of the water filter is lighted, it means the water filter should be changed. And after the water filter is changed, please press the water filter reset button M, and the indicating light of the water filter N is out.

CONTROL AND DISPLAY SYSTEM

10. The function of showing and controlling

30 seconds after Operating the refrigerator by pressing the button, the vision screen is out automatically, and if you press any button or open any door or take out the cold drink, the vision screen will be shown to be on.

11. Exceptions Indicating

When exceptions on the main controlling function of the refrigerator happen, the exceptions signs will appear on the vision areas of the chill-cold storage or refrigerant temperature, and the exceptions signs are: F1, F2, F3, F5, F6, Ed, ER, E0, EI, E2.If this case really happens, please consult the sold-repairing department to have the refrigerator repaired, in order to test the optimizing controlling of the refrigerator.

12. Door-opening alarm

When any door body is opened for over 60 seconds, the door-opening alarming function of the refrigerator will be started, and the refrigerator will produce buzzers at the intervals of 30 seconds, which shows to the user that there is a door body is open.

13. Over-voltage protection

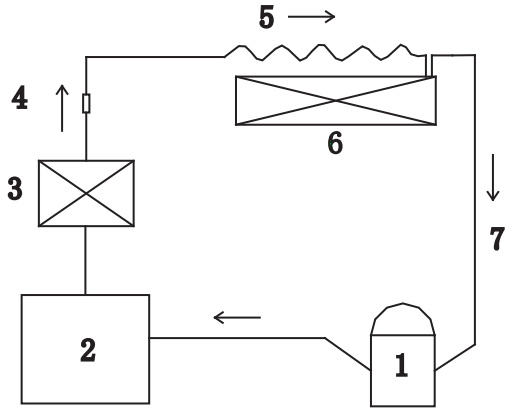
Press Button F and Button G and Button J on the vision board at the same time for three seconds, the Celsius will be used after the first sound of the buzzer; Press Button F and Button G and Button J on the vision board at the same time for three seconds again, the Fahrenheit will be used after the first sound of the buzzer.

14. Power-breaking memorizing function

When the refrigerator is cut off, the state of the refrigerator before the power-breaking is memorized, and then the refrigerator will be operating with the default values before power-breaking.

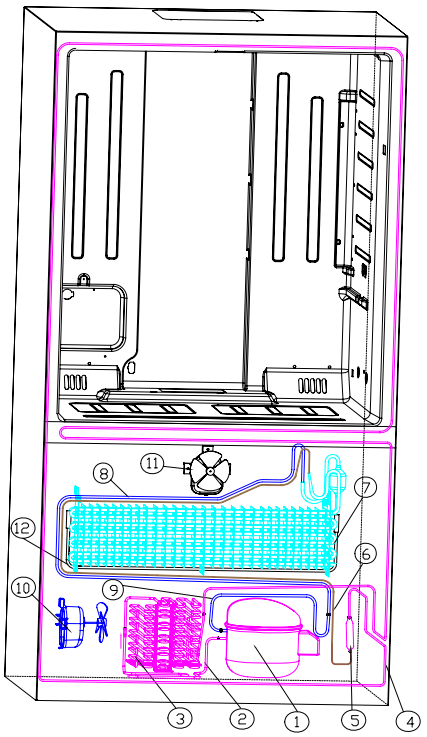
REFRIGERATION PRINCIPLE

SYSTEM FLOW CHART



1.Compressor
2.Dew proof Pipe
3.Condenser
4.Dry Filter
5.Capillary
6.Evaporator
7.Connector pipe

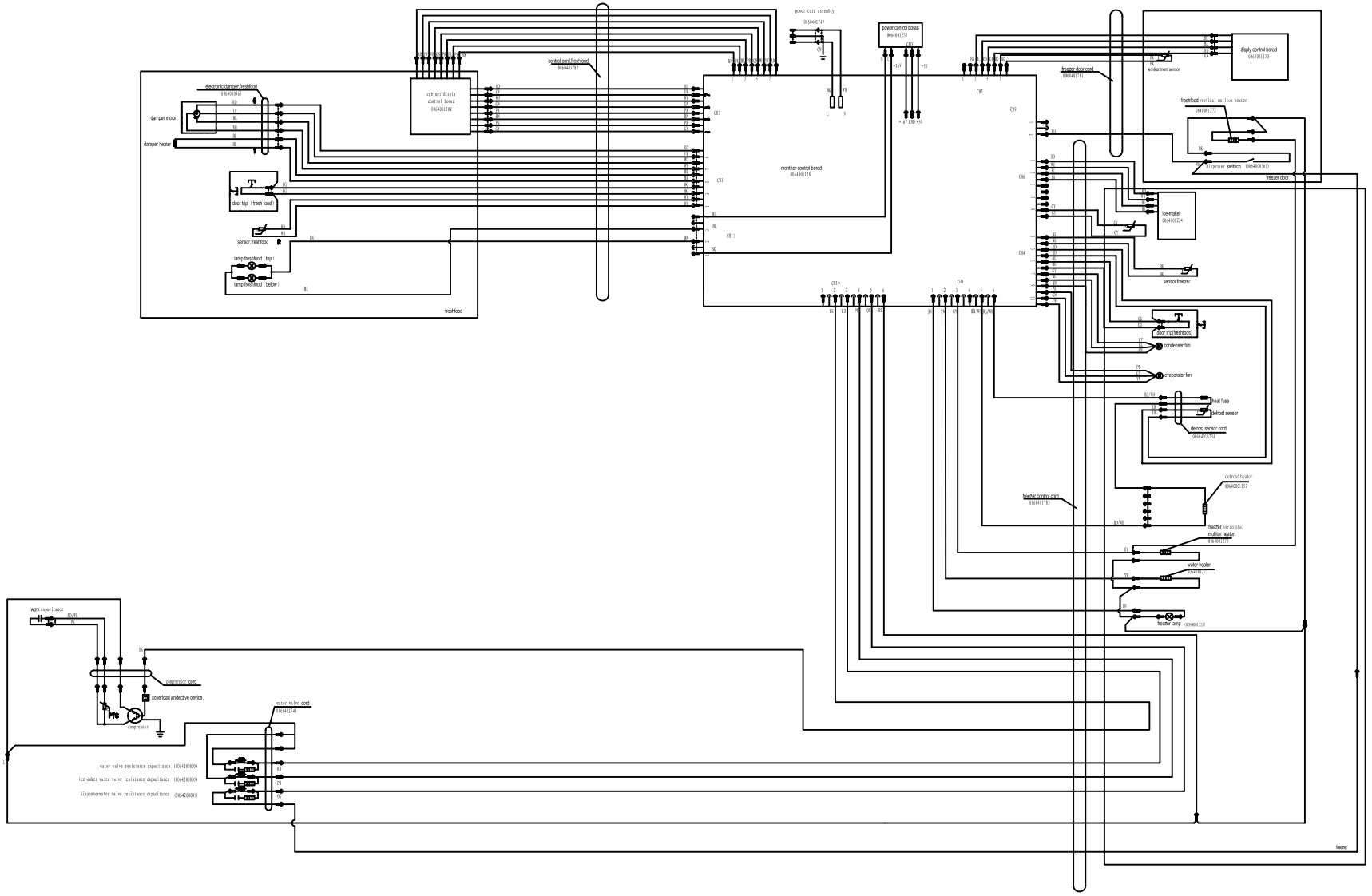
SYSTEM FLOW SCENOGRAPH



① Compressor
② Hot Connector pipe
③ Condensor
④ Freezer anti sweat tube
⑤ Drier filter
⑥ Capillary
⑦ Evaporator
⑧ Suction pipe
⑨ Connector pipe
⑩ Compressor DC fan motor
⑪ Freezer DC fan motor
⑫ Defrost steel tube heater

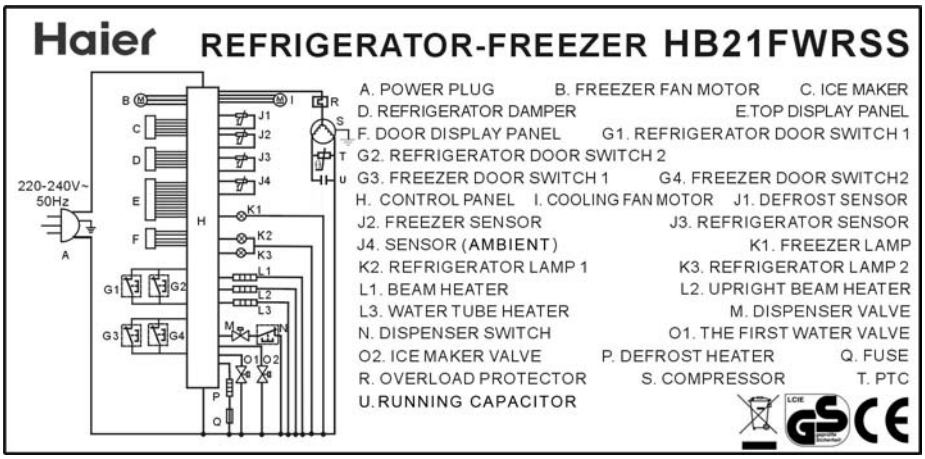
CIRCUIT DIAGRA

1. Connect diagram



CIRCUIT DIAGRA/SENSOR AND ERROR CODE

2.Brief principle diagram



SENSOR AND MALFUNCTION CODE

NO.	Spare Parts Description	Spare Parts Code	Price ($)	Error Code
1	Refrigerator Sensor	0064000024	0.5	F1
2	Environment Sensor	0064000024	0.5	F3
3	Defrost Sensor	0064000025	0.5	F5
4	Freezer Sensor	0064000025	0.5	F2
5	Icemaker Sensor	0064000025	0.5	F6

1. Introduction of Sensor Parts

The name and position of sensor

Name	Marker	Position
Freezer sensor	F SNR	right side wall of freezer room
Refrigerator sensor	R SNR	right side wall of fridge room
Environment temperature sensor	RT SNR	bottom of freezer hinge box
Icemaker sensor	ICE SNR	bottom of ice maker
Defrost sensor	D SNR	top of freezer evaporator

2.Malfunction Codes Problems

It won't display malfunction codes when the machine is in malfunction. Press freezer temperature control button (>) and fridge temperature control button (<) + (>) these three button simultaneously for 3 seconds, malfunction codes will displayed on cabinet display panel, then press these three button a new 3 seconds, machine come back to natural display. Machine will exit automatically if no manual operation.

Malfunction Codes Table

NO	Item	Malfunction Code	Meanings of Code
1	Normal	Display Setting Temperature	No
2	Freezer sensor malfunction	F2	F SNR short circuit or open circuit
3	Environment Temperature Sensor malfunction	F3	RT SNR short circuit or open circuit
4	Refrigerator sensor malfunction	F1	R1 SNR short circuit or open circuit
5	Defrost sensor malfunction	F5	D SNR short circuit or open circuit
6	Icemaker sensor malfunction	F6	ICE SNR short circuit or open circuit
7	Freezer sensor malfunction	E1	No single send out more than 30 seconds
8	Cooling fan motor malfunction	E2	No single send out more than 30 seconds
9	Defrost Heating System error	Ed	Defrost sensor temperature can't reach to 7 centigrade after temperature rise more than 2 hours
10	Icemaker system malfunction	Er	Can't detect on/off single when icemaker rotate

Electrical Control Principle

1. Overview

HB21FW refrigerator electrical control principle:

Whole wind cooling design, with controlling of fixed frequency compressor.

Temperature in the fridge is controlled by the fridge sensor R controlling the switch of the air escaper..

Temperature in the freezer is controlled by the freezer sensor F controlling the operating of the compressor.

Ice making operates by icemaker sensor and main control board, which control the cycle of ice pushing.

2.Main Control Board of HB21FW

There are 13 socket connectors on the main control board of HB21FW

First, let's look at the socket connector:

CN1 is the socket connector for the fridge, parts from left to right are:

1-2 Connect to fridge sensor. We can check the resistance of fridge sensor by tests these two wires. The resistance range of fridge sensor should be 6.35-3.88KΩ if it works right (correspond to 0℃-10℃).The resistance range should be 2.45-1.58 KΩ at regular temperature (correspond to 20℃-30℃).

3-4 Connect to the fridge door switch. They are connected when the door is open, and disconnected when it is shut.

5-6 Heater of fridge air escaper. Measurement of the two wires gives the output voltage (DC 12V) and the resistance (144Ω±10%) of the heater;

7-10 Connect to air escaper motor.

CN2/CN3 are the socket connecting cabinet display panel.

CN4 Parts from left to right are,

1-2 Connect to Freezer sensor. We can check the resistance of freezer sensor by tests these two wires. The resistance range of freezer sensor should be 10.9-25.19KΩ if it works right (correspond to -10℃- -25℃).The resistance range should be 2.49-1.61 KΩ at regular temperature (correspond to 20℃-30℃).

3-4 Connect to the defrost sensor; Measurement is same as freezer sensor.

5-6 Connect to the freezer door switch. They are connected when the door is open, and disconnected when it is shut.

7-9 Connect to cooling fan motor. Measurement of the 8-9 two wires gives the output voltage (DC 11-13V) of the cooling fan motor.

10-12 Connect to freezer motor. Measurement of the 11-12 two wires gives the output voltage (DC 11-15V) of the freezer motor.

CN5 is the socket connector for the display panel on the door, parts from left to right are:

1-2 are spare.

3-6 Connect to the display panel on the door, Measurement of the 3-4 two wires gives the output voltage (DC 12V).

7-8 Connect to the environment temperature sensor.

CN6 is the socket connector to ice maker, parts from up to down are:

1-2 Connect to the icemaker sensor; Measurement is same as freezer sensor.

3-4 are spare.

7-8 Connect to ice maker stop switch..

9-10 Connect to Icemaker motor.

CN8 Connects to the electromagnetic subassembly of distributor. Parts from left to right are,

1 Connects to freezer door switch.. Measurement of this point and null line gives the operation voltage (DC 220V) of freezer lighting;

2 Connect to the inlet pipe heater. Measurement of this point and null line gives the resistance (14±1KΩ)of the inlet pipe heater and the operating voltage (AC 220V)

3 Connect to the upright girder heater. Measurement of this point and null line gives the resistance (2420±130Ω)of the upright girder heater and the operating voltage (AC 220V).

4 is spare.

5-6 Connect to the defrost heater. Measurement of these two point gives the resistance (194±10Ω)of the defrost sensor and the operating voltage (AC 220V).

CN9 Parts from left to right are,

1 Connect to the horizontal girder heater. Measurement of this point and null line gives the resistance (1936±100Ω)of the horizontal girder heater and the operating voltage (AC 220V).

2 is spare.

CN10 parts from left to right are

1 is spare.

2 Connects to live line of the compressor.

3 Connects water valve. Measurement of this point and null line gives the operating voltage (AC 220V) of the water valve.

4 Connects to water valve of icemaker. Measurement of this point and null line gives the operating voltage (AC 220V) of the water valve of icemaker.

5 Connects to water valve of dispenser. Measurement of this point and null line gives the operating voltage (AC 220V) of the water valve of dispenser

6 is null line.

CN11 parts from left to right are,

1 Connects to L of the power filter board.

2-4 Connects to fridge door switch.. Measurement of this point and null line gives the operation voltage (DC 220V) of fridge lighting;

3 Connects to N of the power filter board.

CN12 is the power supply for the power filter board. Parts from up to right are,

1-2 Connect to ground line.

3-4 supply DC 12V voltage.

5-6 supply DC 16V voltage.

CN13 Connects to the live line of power cable.

CN14 Connects to the null line of power cable.

3. Air Escaper Controlling Pinciple

(1)Air escaper's open and close is controlled by fridge sensor R SNR.

(2)Air escaper is closed from the start of defrosting cycle to 15 minutes before the end of defrosting cycle.

(3)Air escaper is closed firstly and then opened once, then open or close of air escaper is controlled according condition (1).

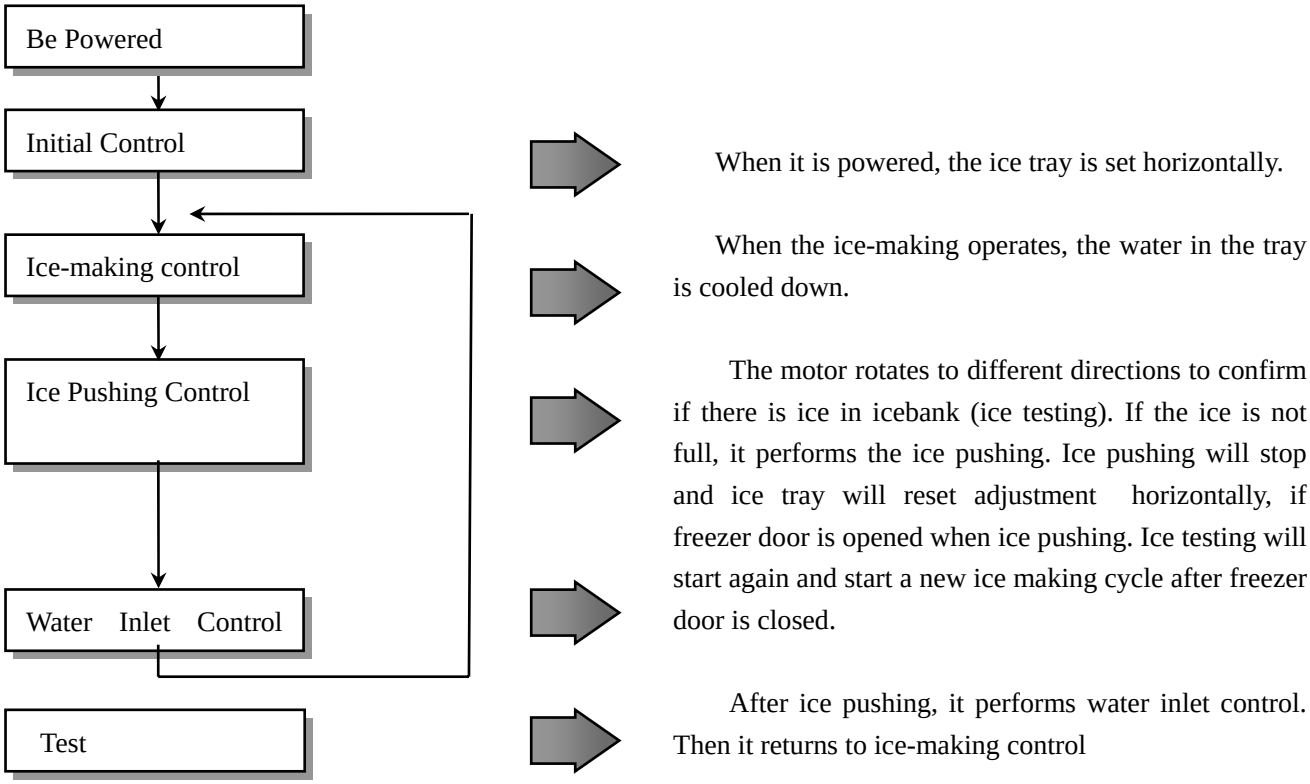
(4)If air escaper is closed more than an hour, it will be opened at a time. Then open or close of air escaper is controlled according fridge sensor R SNR.

(5)The heater of air escaper is controlled along with compressor.(The heater of air escaper is connected when the compressor is running, and disconnected when compressor is shut.)

(6)When the air escaper is open (or close) in 10 minutes, if the temperature is still rising (or fall), the air escaper will open (or close) once more.

4. Ice Maker Control Principle

4.1Operation Process of the Icemaker


Be Powered
Initial Control
Ice-making control
Ice Pushing Control
Water Inlet Control
Test
When it is powered, the ice tray is set horizontally.
When the ice-making operates, the water in the tray is cooled down.
The motor rotates to different directions to confirm if there is ice in icebank (ice testing). If the ice is not full, it performs the ice pushing. Ice pushing will stop and ice tray will reset adjustment horizontally, if freezer door is opened when ice pushing. Ice testing will start again and start a new ice making cycle after freezer door is closed.
After ice pushing, it performs water inlet control. Then it returns to ice-making control

The motor will rotate to start ice pushing, when the temperature of ice maker sensor drop to -12℃ and the time interval of two ice making cycle arrive at 60 minutes. The ice maker will rotate every 100 minutes if the ice make sensor is error.

Under the condition that the freezer light switch is closed, press and hold the freezer temperature control button “<” and the fridge temperature control button “>” simultaneously for 3 seconds, then start icemaker self-testing

Press and hold the freezer temperature control button “<” and the fridge temperature control button “>” simultaneously for 3 seconds, “EXPRESS FRZ “blinking on the cabinet display panel, then the icemaker stops operating. Press and hold the freezer temperature control button “<” and the fridge temperature control button “>” simultaneously for 3 seconds again, then the icemaker restarts.

4.2 Water Inlet Control Principle of Icemaker

Water Inlet Control

Water inlet quantity can be controlled through button on the display control panel. Press and hold freezer temperature control button for 3 seconds under the locked condition, the buzzer beeps once, then enter into inlet quantity adjustment and inlet time is displayed on the display area of freezer temperature. For an example: It will display 6.0 on the display area of freezer temperature if the inlet time is 6.0 seconds. Inlet time is set to 6.5 seconds initially, press freezer temperature control button once, the inlet time changes to 7.0 seconds, then increase from this point. When the inlet time is set to 8.0 seconds, press freezer temperature control button once again, the inlet time changes to 4.0 seconds. Please refer to the following table:

Water Inlet quantity

Series	Inlet Time (Second)
1	4.0
2	5.0
3	5.5
4	6.0
5	6.5
6	7.0
7	7.5
8	8.0

Inlet time is execute the time before adjustment, If the inlet time is adjusted under the water inlet condition. New inlet time will execute next time

5. Refrigerator Test Model

TEST1：For testing the capability of cooling, press and hold the freezer temperature control button (<) and the freezer temperature control button (>) on the cabinet display panel for 3 seconds simultaneously to enter into <PULL DOWN MODEL>, “T1T1” will show on the display screen and force appliance to cool down immediately : during this time the compressor run normally, fan motor run at a high speed and defrost heater is switched off .

TEST2：Under TEST1 MODE, hold the freezer temperature control button (<) + (>) and REST

button a new 3 seconds to enter into <FORCE DEFROST MODEL>, “T2T2” will show on the display screen and force appliance to defrost immediately: during this time the compressor and fan motor are switching off, defrost heater is switching on. Power of the defrost heater should be 250±15W here.

When temperature around defrost sensor above 7 degree, appliance will exit < FORCE DEFROST MODEL > after heater working 1 minute!

When temperature around defrost sensor below 7 degree, heater will work continually until reach 7 degree, appliance then exit <Force defrost MODEL>!

TEST3：Under TEST2 MODE, hold the freezer temperature control (<) + (>) and REST button another 3 seconds to enter into <Assist heater MODEL>, “T3T3” will show on the display screen and force heater of upright girder , heater of Freezer horizontal girder, heater of water enter pipe for ice-maker and heater of fridge damper to switch on, during this time the lamps in fridge and freezer room are all off and display screen . Power of test should be 50±4W here

6. Fan motor control

6.1 Freezer fan motor control

The freezer fan motor is controlled by main control panel according to these following conditions. The speed of DC fan motor is adjusted adopting PWM mode. AC fan motor run directly .

(1) Conditions for switch-on and switch-off (The fowling table is the control mode of DC Fan motor. AC fan motor run under conditions for switch-on and stop under conditions for switch-off).

(2) When the fridge door is opened, freezer fan motor start running and fridge air escaper open, then fridge air escaper will shut after 2 minutes.

(3) Freezer fan motor stop running when the freezer door is opened.

(4) How to judge the freezer fan motor is in LOCK condition: If the speed of fan motor no more than 300RPM or stop running, and this condition last for more than 30 seconds, please check the malfunction display of freezer fan motor. It will come back to normal display if motor in normal condition, or else display freezer fan motor malfunction still.

6.2 Cooling fan motor control

(1) The cooling fan motor runs at the same time with the compressor.

(2) How to judge the cooling fan motor is in LOCK condition: If the speed of fan motor no more than 300RPM or stop running, and this condition last for more than 30 seconds, please check the malfunction display of cooling fan motor. It will come back to normal display if motor in normal condition, or else display freezer fan motor malfunction still.

(3) The cooling fan motor is always working at invariableness speed 1100RPM (12V).

Conditions for switch-on			Conditions for switch-off
1780RPM	**1500RPM**	**1300RPM**	
1.Duration from the product connected to the power supply for the first time till the air escaper is closed once; 2.The Product is set to "Fast-freezing" 3.The product is in forced starting mode; 4.The product is in fast freezer mode. 5.TEST MODE1; 6.The fridge door is open for 2 minutes.	It's the general condition, and the condition of high speed is excluded.	Power consume mode	1. Auto defrost mode or forced-defrost mode; 2. Within 12 minutes after defrost; 3. The compressor stops and the fridge air escaper is shut. (Power consume mode is excluded.) 4. Freezer door is open. 5. TEST MODE3（heater test）
14V	**11.5V**		

7.Defrosting Control

The product will start defrosting after compressor has running more than accumulative total 7 hours, and will stop defrosting when the defrost sensor temperature rise up 7 centigrade.

The compressor is stop and fridge air escaper is close when defrosting.

The first defrosting cycle start after compressor has running more than accumulative total 4 hours, if the product is powered initially or reset the control board.

After defrosting, if the compressor has running more than accumulative total 4 hours, product will controlled according to:

a. Fridge sensor temperature is more than 10 ºC , start defrosting immediately

b. Freezer sensor temperature is more than -5 ºC, start defrosting immediately

c. Fridge door and freezer door has opened more than 5 times, start defrosting immediately

d. No above instance, the product will start defrosting after compressor has running more than accumulative total 7 hours,

The product can enter into defrosting mode, and exit defrosting mode after the defrosting time is more than 120 minutes, when the defrosting sensor malfunction (short circuit or open circuit).

If defrosting time is more than 120 minutes and the defrosting sensor temperature can't reach 7 ºC, the product will disconnect defrosting heater, and display ED on fridge display area under malfunction mode until in some defrosting cycle the defrost sensor temperature reache 7 ºC.

If the product is set to enter into fast freezer or fast fridge, the icon of fast freezer or fast fridge will light, but the defrosting process will go on, fast freezer or fast fridge mode will not execute until finishing this defrosting cycle. The surplus defrosting time is not reckoned in the time of fast freezer or fast fridge.

After one defrosting cycle and the compressor and fan motor have stopped running more than 7 minutes, if the freezer sensor temperature is over the stopping point, the compressor will start running immediately. Then the cooling fan motor will start running after the compressor has worked 5 minutes, the air escaper ON/OFF will control according to the temperature. If the freezer sensor temperature is lower than stopping point, it will wait until the temperature come back to the top of stopping point. Then the cooling fan motor will start running after the compressor has worked 5 minutes, the air escaper ON/OFF will control according to the temperature.

Advance Cooling before Defrosting：In order to assure the lowest temperature rise of the freezer room and fridge room, the compressor and cooling fan motor will start running until the freezer sensor temperature reach to the off-point -3 ºC, then start defrosting. If the product can't reach off-point -3 ºC more than 30 minutes, the forced defrosting mode will start.

TROUBLESHOOTING

Troubleshooting and Repair

1. Normal Phenomena—Not Troubles for Refrigerators

In a domestic refrigerator, there is not only a complicated electric control system, but also a refrigerating system that is difficult to discern whether it is in a good working condition. Both the systems are related and affect each other. If a certain part of a refrigerator works abnormally .Its refrigerating efficiency will decrease, operation properties will become unstable, or even it cannot be used normally for those serious cases.

Refrigerators are generally of larger volume, once troubles appear, to send them to a service department is really a tough thing, if such is the case, the user will always be in suspense, sometimes, normal phenomena will be erroneously regarded as troubles. Therefore, before we deal with the topics of frequently occurring troubles of refrigerators and their remedies, we should firstly give a brief account of some normal phenomena which are not troubles .In case any one of such phenomena occurs, there is no need to worry about it, and the user can use it at total ease.

1). When the compressor of a refrigerator has just stopped running, a rumbling sound can be heard from inside its evaporator. This is a sound caused by the flowing of refrigerant in the evaporator tubing. Because the pressure difference is still greater after the compressor has just stopped running, the refrigerant will flow for a certain time; therefore, this sound is a normal phenomenon.

2). A click sound can often be heard from the refrigerator. This is a normal sound produced by the pull-in or release of the armature of a current deadweight start relay when starting the compressor .The compressor motor will produce a slight and uniform sound while it is running. This sound is not easy to be heard in the daytime, but of course it can be heard distinctly at night.

3).The compressor consists of an electric motor and a compressing apparatus .During its normal operation ,the motor's stator core and windings will rise to a temperature in the range of 100℃~110℃ ,and the temperature of the piston and cylinder of the compressing mechanism can also reach as above 100℃ due to the heat produced when compressing refrigerant .Most of the heat radiates to the air through the compressor casing ,therefore ,its casing is generally at a temperature between 85℃~90℃ ,it is very hot ,particularly in summer when the ambient temperature is higher .All these are normal phenomena .

4). For the forced air cooling refrigerator, a kind of irregular crack sound can be often heard when the compressor is running for a certain period of time or has just stopped its running. The stress relief due to expansion and contraction causes this sound when temperature changes, and will not affect the normal application of refrigerator.

2. Common Troubles in Refrigerators and Their Remedies

Causes for troubles occurring in refrigerators are closely related to the quality of components and workmanship in assembling by manufacturers as whether refrigerators are properly used and maintained .The parameters generally used to express the working conditions of a refrigerator include the temperature inside the refrigerator, operation rate, electric power consumption, noise level, and other functional indexes .If any one of these parameters is beyond its permissible range, this indicates that there is a fault or trouble in the refrigerator.

During the whole service life of a refrigerator, the probability of troubles occurring within a union time is called its failure rate. Making a comparison between the control circuit system of a refrigerator and its refrigerating system, we can find that the failure rate of the former is higher, and that of the thermostat is the highest. In troubleshooting, the first thing you must do is to determine where the trouble comes from --- the control system or the refrigerating system. There is general no trouble indicating instrument mounted on the domestic refrigerator, locations and natures of troubles should be determined according to their respective features, therefore, experience in servicing is very important to troubleshooting. Service technicians with rich experience can correctly locate them and take reasonable remedy measures based on their comprehensive analysis of trouble characteristics as well as operating conditions for various kinds of refrigerators.

Three Essentials for Checkup

1) Look

a) Check the tubing of refrigerating system for cracks and various welding points for leaks; if leakage occurs, an oil stain can be seen definitely .
b) Check the suction and exhaust pressure values (high pressure and low pressure) of compressor to see whether they are normal.
c) Check the conditions of frost attached to its evaporator and gas return tube .It is abnormal if frost has formed on part of the evaporator or there is no frost attached to it. (This criterion is not applicable to the evaporator of refrigerator compartment.)
d) Pay attention to the speed of temperature drop inside both the refrigerator compartment and freezer compartment .It is abnormal if the speed of temperature drop is obviously slower than the corresponding normal speed.
e) Check the environment to see whether it is suitable for placing a refrigerator.
f) Check refrigerator door seal, case, and table surface and heat insulation layer.

2) Listen

a) Listen to the noises produced when the compressor is running

Hums from a fully enclosed aggregate unit is the sound caused by overload indicating that the motor cannot be started normally, meanwhile, a clattering sound can be heard from inside the start relay, which is produced because the start contacts cannot be released normally whistling sound is caused by the high pressure gas flowing out of the crack of the pressure tube inside the compressor, and clucks are the sound of striking after the suspended spring inside the compressor has broken.
During the normal operation of compressor, a slight and uniform hum sound due to undulation of electric current can be heard generally, this is a normal phenomenon. However,

if it sounds like “tong, tong…”, i.e., an impact sound inside the compressor, this means that a large quantity of wet vapor of refrigerant or refrigerating oil has come into the compressor cylinder; if it sounds like “dang, dang…”, a striking sound of metal parts inside the compressor ,this means that some moving parts have loosened (note to differentiate this sound from those formed during starting or stopping the compressor).

b) Listen to the sound caused by the flowing of gas in the evaporator.
Open the refrigerator door while the compressor is in operation , incline your ear and listen attentively the gas flow sound inside the evaporator .If it sounds like gentle whistling accompanied by a sound similar to water flowing ,this is the sound produced by the normal circulation of refrigerant within the evaporator .In case only the gas flowing sound can be heard and there is no water flowing sound ,this indicates that the refrigerant has already percolated .If neither the flowing sound nor the gas sounds from the evaporator can be heard ,this means that the filter or capillary has been clogged .

3) Touch and Feel

a) Feel the compressor when running ,its temperature should be generally less than 90℃ in the normal state (it may exceed 90℃ in case of running for a longer period of time).

b) After the compressor has operated normally for 5~10 minutes, touch and feel the condenser, the temperature of its upper part should be higher than that of its lower part (or its right part is hotter than its left part, depending on the type of condenser coil), this indicates that the refrigerant is circulating. If the condenser is not hot, this means the leakage of refrigerant, In case the condenser radiates heat for only several minutes and then cools down, this means that the filter and capillary have been clogged. As for the forced air cooling condenser, hot air will be blown out of it; this means that the system is out of order.

c) Feel the filter’s temperature. During the normal operation of refrigerating system, the temperature on the filter’s surface should be a little higher than the ambient temperature; if you touch it with your hand, you will have a sense of slight heat. In case dew condensation appears due to the fact that its temperature is obviously lower than the ambient temperature, this means that most meshes of its screen has been clogged, resulting in an obstructed flowing of refrigerant, thus causing a drop in temperature due to throttling.

d) Feel the temperature of exhaust gas from the refrigerating system .the exhaust gas should be very hot and this is the normal working state. For those refrigerator with enclosed type of compressor refrigerating system, no frost or dew drop will from on the gas suction tube, otherwise, there is something wrong in the system (Frosting and dew condensation may appear for a very short time period when just starting the machine, this is a normal phenomenon).

Because a refrigerator is a combination of several components, they are related and have influence on each other .In case an abnormal phenomenon has been found through the above-mentioned checkups, you need not to make a hasty conclusion based on only one abnormal phenomenon .It is advisable to find out two or more abnormal phenomenon, or conduct troubleshooting comprehensively with the aid of instruments or other ways, because several kinds of troubles may share a common abnormal phenomenon, and two or more abnormal phenomena may occur simultaneously due to a certain trouble .With this method , you can reject some suspicious troubles and finally make a correct judgment .

3. Analysis of Troubles and Troubleshooting

A. Poor Refrigerating Effect

The so-called "poor refrigerating effect " refers to the fact that the refrigerator can operate and refrigerator normally, but the temperature in the refrigerator cannot drop to the prescribed value under the stipulated working conditions. In view of there are many causes for this phenomenon, we are going to discuss and analyze it in the following 7 aspects:

1) Leakage of refrigerant
Analysis of Trouble
The leakage of refrigerant in the system will result in an insufficient refrigerating capacity, the resulting phenomena are its lower gas suction pressure and exhaust pressure as well as higher exhaust gas temperature. The exhaust tube feels rather hot, and a continuous gas flowing sound louder than usual can be heard at the outlet of the capillary, and no frost or a smaller quantity of loose frost appears on the evaporator. After shut down, the balance pressure in the system is usually lower than the saturation pressure corresponding to the same ambient temperature.

Remedy
In case there is leakage of refrigerant from the system, do not hurry to recharge it with refrigerant, manage to find out leak points immediately, and make a note of from where it leaks ---welding points and parts. After having them repaired, recharge refrigerant.
There are so many joints and sealed surfaces in a refrigerator, accordingly, quite a lot potential leak points do exist in the system. In troubleshooting, pay attention to those parts that are liable to leak, check main connection points for oil seepage and tubing for cracks. If there is no severer leak point, charge the system with nitrogen and detect leak points with the commonly adopted method, repair them, evacuate, charge the system with refrigerant, and then turn on the refrigerator to make a test run.

2) Too much refrigerant charged into the system

Analysis of Trouble

a) In case the amount of refrigerant charged into the system exceeds its nominal capacity, the superfluous refrigerant will of course take some space of the evaporator, thus reducing its heat-dissipation area and hence the refrigerating efficiency of the system. The abnormal phenomena caused by this reason are as follows: the gas suction and exhaust pressures are generally higher than their respective normal values, the temperature of its condenser is higher and the electric current of the compressor rises, loose frost forms on the evaporator, the refrigerator temperature drops slowly, and frost appears on the gas return tube .
b) In case excessive refrigerant has been charged, the liquid refrigerant that can not evaporates in the evaporator will return to the compressor, and thus a phenomenon of "liquid striking" will occur. The liquid refrigerant evaporates and effervesces as soon as it flows into the refrigerating oil at the bottom of compressor .If the condition is severe, foams will fill all over inside the compressor housing and be sucked by the piston, causing damage to the components of compressor.

Remedy
According to the operating procedures, it is mandatory to turn the machine off, and several minutes later, open the refrigerant charging tube and let the refrigerant escape from it, replace the dry filter, recharge refrigerant after evacuating, and then seal the charging port.

3) There is air left in the refrigerating system

Analysis of Trouble
Residual air in the refrigerating system will reduce its refrigerating efficiency .The prominent phenomena are the increase in its gas suction and exhaust pressures (however, the gas exhaust pressure will not exceed its rated value), obvious increase in temperature in the segment from the compressor outlet to the condenser inlet. Because there is air in the system, both the gas exhaust pressure and temperature will rise, and moreover, the gas flowing sound is intermittent and obviously louder.

Remedy
After shut down for several minutes, open the tubing, evacuate it and then recharge the system with refrigerant.

4) Low efficiency of compressor

Analysis of Trouble
Low efficiency of a refrigerating compressor refers to the actual reduction of gas discharge capacity, and hence the corresponding reduction of refrigerating capacity, under the condition that the refrigerant in the system is unchanged. This phenomenon occurs mostly when the compressor has been used for quite a long time, its moving parts have worn to a considerable degree, fit clearance between various parts have increased and sealing property of its gas valve has deteriorated, resulting in an decrease in its actual gas discharge capacity.

Methods of Judgment

Measure the high and low pressures with pressure gauges to see whether they are normal. If an abnormal sound comes from the compressor or the temperature of its causing is too high, cut the discharge port open and operate the compressor, feel it if there is pressure at the discharge port with your finger (For a normal compressor, its discharge port is difficult to be blocked with your finger if you just apply a little effort).

5) Refrigerating oil left in evaporator tubing

Analysis of Trouble
During the process of refrigerating cycles, a little refrigerating oil may remain in the evaporator tubing, and after a longer time of operation, if there is considerable refrigerating oil left in the evaporator, the heat conduction effect will be severely affected, thus causing a poor refrigerating effect.

Remedy
It is quite difficult to determine whether this trouble is caused by the refrigerating oil left in the evaporator tubing, because this kind of phenomenon and other several trouble are tends to be

confused. Generally speaking, you can make a judgment based on the frost formed on the evaporator. If the frost does not cover the evaporator, and moreover, it is loosely formed, you can make a judgment that the deterioration of refrigerating effect is due to the accumulation of refrigerating oil left in the evaporator tubing in case no other troubles have been found. To clear off refrigerating oil left in the evaporator, dismantle the evaporator, purge it thoroughly and then dry it. In case it is difficult to dismantle it, charge refrigerant from the evaporator inlet to wash it several times, then purge and dry it with nitrogen.

6) Flowing obstructed in refrigerating system

Analysis of Trouble
Because the refrigerating system was originally not purged thoroughly, some of the filter screen meshes have been clogged by dirt accumulated in the filter after using it for a certain time of period, thus resulting in a decrease in flow rate, and hence a poorer refrigerating effect. The abnormal phenomena caused by this kind of slight clogging in the system are as follows: the gas discharge pressure is lower, the temperature of discharged gas drops down, the position clogged has a temperature lower than that in normal conditions, and for a severe clogging, even dew condensation as frosting may appear.

Remedy
Purge the tubing, and after replacing the dry filter with a new one or clearing it thoroughly, recharge the system with refrigerant and seal the charging port.

B. No Refrigerating

The phenomenon that the compressor runs normally, but no frost (or only a little frost) appears on the evaporator, and the refrigerator temperature does not drop down is called "no refrigerating". There are many causes for this trouble and it is relatively complicated, too. In servicing, special attention to finding direct causes for this phenomenon. Three main potential causes for this trouble are analyzed below:

1) All refrigerant in the system has leaked out

Analysis of Trouble
Leak points in the refrigerating system have not been found and repaired timely, thus resulting in the total escape of refrigerant. There are two kinds of leakage: I) slow leakage for instance, when we want to use a refrigerator that has been put out of quite a long time, we find the leakage of refrigerant, or in the course of its operation, we have found that the refrigerator is gradually becoming not so cold and finally no refrigerating cab be achieved; ii) fast leakage in that case, all the refrigerant will escape swiftly due to abrupt rupture of system tubing.

Symptoms of total leakage of refrigerant are mainly as follows: the compressor can be started easily (if there is no damage to the compressor parts) and its operating current becomes low, its gas suction pressure is high and discharge pressure is lower, the gas discharge tube feels rather cold, no sound of gas eruption from the liquid in the evaporator can be heard, and no will gush out of the process tube if you cut it open after shutdown.

Remedy
Check the whole machine, particularly those locations, which are liable to leak. After leak points have been found, repair them or replace them with new parts according to specific circumstances, then evacuate the system and finally charge refrigerant.

2) Refrigerating system has been clogged

a) Clogged with Ice
Analysis of Trouble
The dryness treatment for the major parts in the refrigerating system has been performed improperly, the effect of air purging for the whole system is not good ,or the water content in the refrigerant is out of standard ,all these will cause the expansion valve to be clogged with ice .The symptom for this trouble are as follows :the refrigerator sometimes can refrigerate and sometimes cannot :the refrigerator compartment works normally at the beginning ,but after working for a certain period of time ,frosting begins at the clogged position ,evaporation temperature reaches below 0℃, water will accumulate at the narrow part of the capillary and clog it gradually ,then frost begins to melt at the evaporator ,no gas flowing sound can be heard ,and the gas suction pressure assumes a state of vacuum .Note that these phenomena will appear intermittently ; sometimes ,the refrigerator works well ,and sometimes not well .In order to determine whether it is clogged with ice ,heat the suspicious points with hot water to make ice melt ,and after a while if a gas flowing sound resulting from an abrupt gush is heard and the gas suction pressure rises as well ,it can be confirmed that the trouble is caused by ice clogging .

Remedy
If there is too much moisture in the refrigerating system, it is advisable to release the refrigerant, purge the tubing with nitrogen, and then charge the system with the filtered refrigerant. However, the commonly adopted method is to connect a filter with moisture absorbers (such as silica-gel, anhydrous calcium chloride) to the refrigerating system so as to filter out the moisture from the system, then replace the filter, evacuate it again and finally charge the system with refrigerant.

b) Clogged with dirt in capillary

Analysis of Trouble
The capillary inlet is a place where coarse-grained dirt or refrigerant oil in the system will tend to settle down and clog it. In case considerable dirt accumulates there, the whole filter screen may be blocked totally, making the refrigerant unable to go through. Clogging with dirt exhibits the same symptoms as that with ice, namely, higher gas suction pressure, lower temperature of discharged gas, and no gas flowing sound from the evaporator. The difference between the both is as follows: if the clogging is caused by dirt, tapping the suspicious clogged point (generally in the capillary or the connection joint of the filter) may cause the refrigerant to flow through partially, resulting in some corresponding change, whereas in that case if you heat it with a hot towel, no reaction will happen, no flowing sound can be heard, moreover, there is no periodic change. After rejecting the possibility of ice clogging, it can be generally considered as the clogging due to dirt.

Remedy
Dismantle the system, remove the dry filter from it, purge the tubing with nitrogen, install a new filter, then evacuate it and finally charge it with refrigerant.

C) Clogging in filter

Analysis of Trouble
Total clogging of a filter is rarely to occur. The paste-like matter formed from the substances filled into the system mostly causes this trouble or other dust after the refrigerator has been used for a longer time, or by the dirt accumulated gradually inside the filter. Sometimes, tapping the filter nay cause a passage for flowing, Touching it with your hand, you will feel that it is cooler compared with its temperature in the normal state.

Remedy
The same as described in the capillary clogging with dirt.

3) Troubles of Compressor

a) Breakage of gas suction and discharge valve blocks

Analysis of Trouble
The compressor works by means of the opening and closing of gas suction valve and discharge valve to suck and discharge the refrigerant. If the valve block is broken, the refrigerant can not be discharged, and hence no refrigerating can be achieved.

Method for making judgement
It is quite difficult to differentiate this trouble from others because they often have similar symptoms. In repairing, firstly, hear attentively if there is some abnormal sound coming from the compressor (sometimes, the broken pieces of valve block may strike against the cylinder), and feel the compressor casing with your hand to ascertain whether it is too hot, this is also helpful to the troubleshooting; secondly, measure the pressures at the high and low pressure ports of the compressor with pressure gauges, if the gas suction valve block is broken, the suction pressure gauge pointer will swing violently and the suction pressure is very high, whereas when the gas discharge valve block is broken , the discharge pressure gauge pointer will swing drastically and the discharge pressure is very high. In the both cases, stop the compressor at once, and if technique is available, open the cylinder cover and check up the valve block, repair it, or replace it with a new one,

C. Sudden stop of Compressor during Its Running

The cause of sudden stop of a compressor during its running is mostly that the gas suction pressure and/or discharge pressure exceed their respective prescribed ranges, thus making a pressure-operated protective relay shut off the power to the compressor and stop it. In the following we discuss mainly the reasons for causing excessively high gas discharge pressure and low suction pressure.

1) Stoppage due to excessively high gas discharge pressure

A)Too much refrigerant charged into the system

Analysis of Trouble
The phenomenon, such as loose frosting and poor refrigerating effect, may occur if excessive refrigerant has been charged into the system. Superfluous refrigerant will occupy a certain space of the evaporator, thus reduce its heat dissipating area, and the phenomenon of "liquid striking" may occur, too. Meanwhile, dew or frost condensation may occur on the gas return tube, and the gas discharge pressure will obviously rise, when it reaches the threshold value, the protective relay will actuate and shut off the power supply to the compressor.

Remedy
Open the tubing, re-evacuate and then charge the system with a proper quantity of refrigerant.

b) Air left in the system

Analysis of Trouble
The residual air in the system will circulate together with the refrigerant in the system. The major symptoms caused by this residual air is higher gas discharge pressure, higher discharged gas temperature (the gas discharge tubing is considerably hot when you feel it with your hand), and poorer refrigerating effect. Furthermore, the gas discharge pressure will exceed its normal value when the compressor has run for a period not too long, thus making the protective relay actuate and bring to a stoppage.

Remedy
Check up how the air has been left in the refrigerating system. Generally, there are two possibilities: one is that the air has been sucked into the system when repairing due to carelessness, or it has not been purged out totally when evacuating the system; the other is that there are leak points at the low pressure end of the refrigerating system. Leak points appear mostly in those low temperature parts or assemblies, because the evaporation temperature is lower for such low temperature devices, especially at the low pressure end, it is easier for the air goes into the system. Once it has been ascertained that air does exist in the system, you have to open the tubing, re-evacuate it and then charge it with refrigerant.

2) Stoppage due to electric troubles

a) Thermostat is out of control

Analysis of Trouble
In case the thermostat does not work in its good order or its temperature sensor has not been installed properly, frequent stoppage is also likely to occur.

Remedy
Try to adjust the temperature sensor's position until the compressor can be started and stopped normally. If this cannot be achieved, and the stoppage still occurs repeatedly, it is most likely that the mechanical parts or contacts are out of order, disassemble the thermostat, make a thorough checkup and repair it.

b) Overload of electric motor

Analysis of Trouble
Probably, too many things have been put into the refrigerator, and hence the thermal load exceeds its refrigerating capacity; or in case the power supply voltage drops considerably, the current flowing through the motor will increase drastically making the thermal protector actuate and the fuse blown, and hence the motor stops running. If the motor is still running continuously in such a case, its windings will be burned out.

Remedy
Reduce the thermal load; pay attention to the variation in voltage of the power supply.

c) Abnormal thermal protection

Analysis of Trouble
The compressor current is within its normal range, but the thermal protector actuates repeatedly.

Remedy
Replace the thermal protector with a new one.
3) Sudden stoppage due to other causes

Normal Stoppage
A thermostat generally controls start and stop of the compressor. When the temperature in the refrigerator reaches its desired value, the thermostat will shut down the compressor automatically. Never take this normal operation as a trouble, care should be taken to differentiate it from other real troubles in servicing.

D. Compressor won 't start
In case the compressor cannot be started, you must find out the origins of this trouble through checkup step by step, because probably there are many causes, including those electrical and mechanical.

1) Inspect the power supply to see whether it is connected to the compressor circuit.

Analysis of Trouble
In case the compressor cannot be started, this will generally exhibit in the power supply circuit, for instance, power failure, poor contact of switch, and blown fuse. Make a comprehensive analysis of these phenomena, find out its real cause and take correct measures to remove this trouble.

Remedy
a) Check the input power circuit to see whether where is voltage of the power supplies, namely, the circuit which is connected to the knife switch. This can be determined with an avometer or a test pencil. If a blown fuse is found, ascertain and remove its cause, then replace it with a new one of the same specifications.

b) Check the compressor accessories, including its thermal protector and relay. In case the thermal protector is damaged, the compressor cannot be powered on. If the relay is out of order, the motor will not run and hum sound can be heard from it after the compressor is turned on, in that case, shut it down immediately, otherwise, the motor windings will be burned out in case this condition lasts longer.

c) Check the relay contacts and plugs to see if they are perfect and work reliably. Poor contact may cause the motor not running or humming.

2) Check the circuit voltage to see whether it is normal.

Analysis of trouble
If the circuit voltage is obviously lower than its rated value, it will be difficult to start the motor, and a hum sound can be heard from it.

Remedy
Measures the voltage with a voltmeter, if it is really too low, give directions to the user for buying a stabilizer so as to step up the voltage, thus normal operation can be achieved.

3) Check the thermal relay to see whether its contacts are closed.

Analysis of Trouble
The contacts of thermal relay sometimes may be open due to the leakage of temperature sensing agent from the temperature sensor.

Remedy

Remove the relay cover to check up its contacts, if they are open, this means that the original setting is not properly set or temperature sensing agent has leaked out of the temperature sensor. Try to turn the adjusting stem of this value in the direction of the lower temperature graduation, then check the contacts to see whether they are closed. If they are still not closed, dismantle the temperature sensing disc and then immerse it into warm water to see whether the contacts actuate, if not, it can be preliminarily determine that temperature sensing agent has leaked out, and it must be replaced with a new thermostat.

4) Motor troubles and other electric faults

a) Motor windings have been burned or short-circuited between turns

Analysis of Trouble
When motor windings have been burned or short-circuited between turns, the fuse will be blown repeatedly, and the blowout occurs particularly at the instant when you close the knife switch.

Remedy

Check the terminals and the outer casing to see whether they are short-circuited, and measure the resistance of each phase with an avometer. If short circuit occurs or the resistance of a

certain phase is low, this means that short circuit does exist in the windings and/or between turns, and insulation layers have been burned or deteriorated. A megametre can be used in this inspection, too. If the insulation resistance is lower than 2 MΩ, this means that the insulation layer is already breakdown. If the motor has been burned, repair it or replaced it with a new one.

b) Fault of control relay

Analysis of Trouble
Overheat, burnout or wear of control relay contacts may occur generally. All these will cause poor contact in electricity.

Remedy
Dismantle it to repair, or replace it with a new one.

c) Poor electric contractor in thermostat

Analysis of Trouble
Burnout of contractor and leakage of temperature sensing agent may occur generally.

Remedy
Replace the old with a new one.

d) Check the terminals for loose connection and electric circuits for other abnormal phenomena.

5) Mechanical faults of compressor

a) Seizing of shaft

This phenomenon is caused mostly by poor lubrication, such as insufficient quantity of lubricant, clogging in the lubricant oil line, or intermittent lubricant oil supply. Dirt and other impurities in the lubricant oil will increase its viscosity and cause the shaft to be seized. Copper plating may also result in seizing of shaft.

b) Seizing of piston

This is caused by too small fit clearance between the piston and cylinder or expansion due to heat.

Judgement of seizing shaft and piston: After the refrigerator has been powered on, the compressor will not start and run, but a slight hum sound can be heard, and several seconds later, thermal protective relay will actuate and make the contacts open; this process will occur repeatedly, but the compressor cannot be started.

E. Compressor won't stop

Sometimes, the compressor will run continuously (for several hours or run without end), If the food placed in the refrigerator is not too much, there may be the following two situations: I) the refrigerator very low, this means that the control system is probably out of order; ii) the control system works normally, and there are troubles in the refrigerating system or other parts.

1) Temperature is set improperly

a) The temperature control knob is set to the "coldest" position. This position is to be used for fast freezing or continuous running, its temperature for power off is too low, therefore, the compressor won't stop and the temperature in the refrigerator becomes lower and lowers.
b) Inspection method: check the temperature control knob to see whether it is set in the position "coldest".

2) Thermostat is malfunctioning and makes the compressor running continuously

Analysis of Trouble
When the thermostat doesn't work normally, it will make the compressor run continuously, and hence very low temperature will be achieved in the refrigerator. The fault is generally due to the fact that the contacts of the thermostat cannot be released.

Remedy
Dismantle the thermostat and make a through checkup, if it is totally out of functioning, replace it with a new one.

3) evaporation temperature is too high in refrigerating system, resulting in lower refrigerating capacity and hence continuous running of compressor
Analysis of Trouble
Leakage of refrigerant and clogging in a refrigerating system will directly affect its refrigerating capacity. Due to the reduction in its refrigerating capacity, the refrigerator temperature cannot reach its rated value, the thermostat won't work, and thus the compressor runs continuously. When the evaporation temperature in the system is too high, the temperature-sensing agent in the temperature sensor is also hotter, therefore, the thermostat is unable to cut off the power supply to the compressor and stop it.

Remedy
If it has been found that the refrigerant in the system is insufficient in quantity, recharge it with refrigerant. In case clogging occurs, disassemble the part where it is blocked. If the evaporation temperature is too high, settle this problem with an appropriate quantity of refrigerant.

4) No stoppage of compressor due to damaged heat-insulation layer inside case body and/or door seal

Analysis of Trouble
When the heat-insulation layer inside the case body deteriorates or the door seal is not closely touches the doorframe, the temperature in the refrigerator will rise and makes the compressor running continuously.

Remedy
Check the heat-insulation layer for its damaged parts; repair it to improve its heat-insulation property. If the door has deformed or the door seal is not tightly sealed against the case body, repair them, respectively.

5) Too much food is placed in the refrigerator, or is placed too densely, resulting in poor ventilation or poor conditions for temperature sensing, and hence no stoppage of the compressor.
6) Too high ambient temperature, poorer ventilation and heat dissipation makes the compressor running without stop.

F. Electric leakage of refrigerator

1) Slight electric leakage

Electric insulation has deteriorated due to being affected with damp, thus resulting in slight electric leakage.

2) Serious electric leakage

Refrigerator case has become live due to faults occurred in some electric devices or the erroneous wiring in installing power cord plug or outlet by the user. This is very dangerous.

3) Electric leakage test

a) Slight electric leakage
A tingle sense will be experienced as soon as you touch the metal parts of the refrigerator with your hand. When you test them with a test pencil, its neon lamp will come on .In that case, the first thing you need to do is to determine whether the grounding is perfect .If the grounding is no problem, turn off the refrigerator immediately, then check the insulation of electric circuits with an avometer.

b) Serious electric leakage

Never touch the case body of the refrigerator, its door handle or other metal parts with your hand. Test the refrigerator with a test pencil, it will
light up intensively ;measure the resistance between the power cord plug and the case body with an avometer ,the reading will be zero (0Ω); in the worst case ,the fuse will be blown .Check the 3-prong outlet to see whether the live wire and the null line are inversely connected ,this makes the ground protection lead-out from the power cord plug being connected to the live wire .Another possibility is that the live wire and null line of the outdoor

power supply circuit have been inversely connected accordingly ,this makes the null line become a live wire .

G. Stronger vibration and loader noise

1) Refrigerator placed improperly

a) Uneven ground
Uneven ground will cause the refrigerator to be placed unsteadily, causing stronger vibration and noise during its operation.
b) Leveling screws not properly adjusted
If the leveling screws on refrigerator legs have not been adjusted properly, vibration and noise will still occur even if the refrigerator has been placed on a level ground.
2) Abnormal noise from compressor

Three suspended spring inside the compressor case are out of balance, and strike against the case, moreover, the wear of compressor parts may cause noise sometimes.

3) Resonance of tubing and loosening of parts

Improper and compact laying of tubes or the loosening of parts may cause vibration and noise.

4）Large noise of the fan
a)The fan motor is loose;
b)Noise is produced by normal operation of the fan.
c)The impellers are not tightly fixed or eccentrically assembled.

Remedy:

For reason a): Fasten the fan motor.

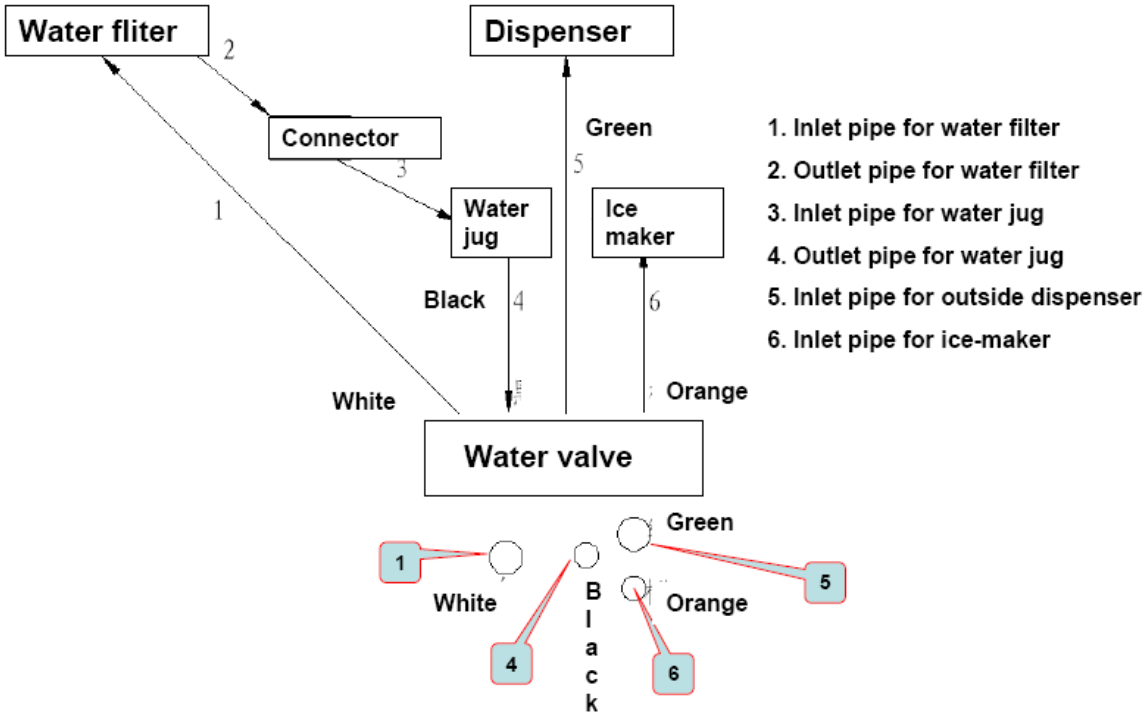
For reason b) or c): Replace the fan motor or impellers.

5)Inspection method

To find the sources of noise, press the vibration spot with your hand while the refrigerator is in operation and listen attentively whether the vibration becomes weaker or vanishes. If the refrigerator has not been levelly placed, put a level meter on its top table and adjust the leveling screws on its legs. In case noise occurs from the compressor, strike different locations on the side surface of its case using a rubber hammer or hand hammer with a wood block in-between so as to determine whether the suspended springs are out of balance or being seized.

Water Way Operation Instruction

HB21FW series water way operation instruction



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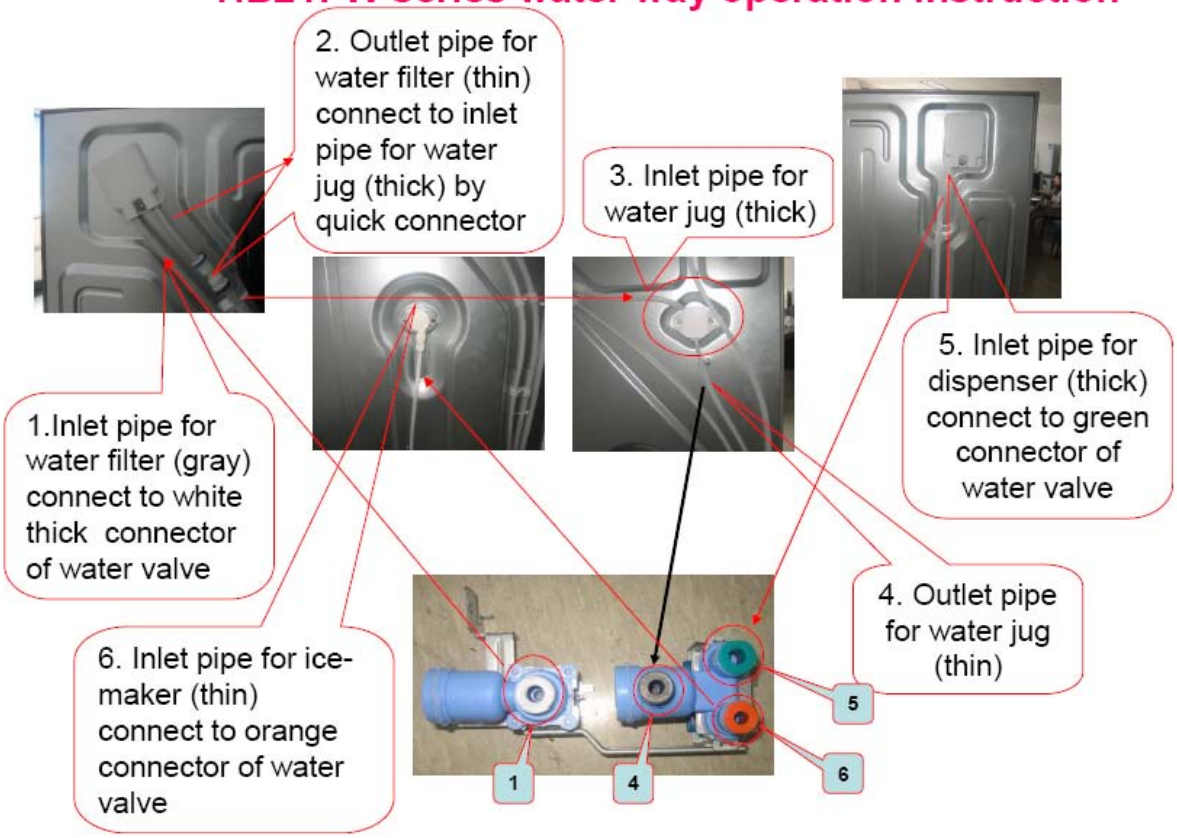
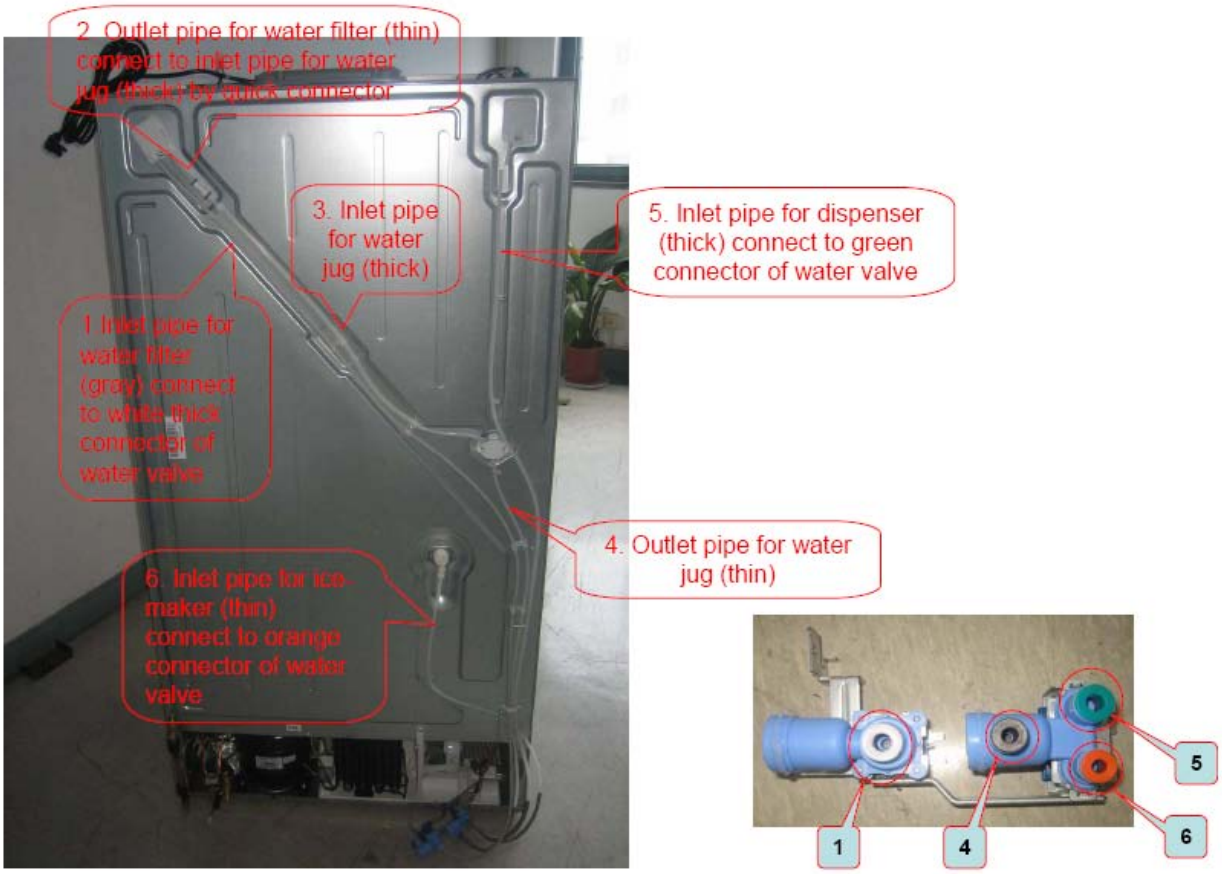

2. Outlet pipe for water filter (thin) connect to inlet pipe for water jug (thick) by quick connector
3. Inlet pipe for water jug (thick)
5. Inlet pipe for dispenser (thick) connect to green connector of water valve
1.Inlet pipe for water filter (gray) connect to white thick connector of water valve
4. Outlet pipe for water jug (thin)
6. Inlet pipe for ice-maker (thin) connect to orange connector of water valve
1
4
5
6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HB21FW series alarm problem check

If there are jingle alarm, please check by following method.

1.Press freezer adjust button">" and fridge adjust button "<" together for 3 seconds on display panel to enter trouble displaying status, estimate the trouble according to error codes. Then press freezer adjust button">" and fridge adjust button "<" together again to exit the trouble displaying status, display panel work normally. --Details please see the service manual.

2.Check whether the switch of freezer and fridge department lights can close normally, if the switches can't close normally, refrigerator will alarm continuously, and not stop after 5 minutes.

3.Check whether the beverage button is turned on all the time, if it is turned on all time, trouble of water valve or display panel may be caused.

Sincere Forever

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